MINING CONGRESS JOURNAL

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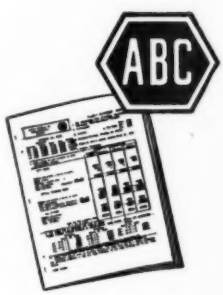


MINING CONGRESS JOURNAL

An A. B. C. Publication

A.B.C. = Audit Bureau of Circulations = FACTS as a yardstick of advertising value

EVERY SEVENTH YEAR they burned the mill . . . and while history does not record the exact fact it is quite probable that recovery methods had advanced by trial-and-error in the intervening seven years to more than warrant destruction of the old mill, its rebuilding anew!

Consider the dramatic technological and economic changes of the past seven years:

Outstanding was devaluation of currency by England in 1931, followed by South Africa in 1932 and the United States in 1933 . . . with a resulting seven-year record output of gold and re-awakened interest in working low-grade precious metal properties.

1932 saw also the silver purchase agreement of the London Economic Conference and the subsequent premium paid for silver by the United States with attendant upturn in production of that metal.

1932 also marked an all-time low in base-metal prices with copper selling at 5 cents, lead at 2.65 and zinc at 2.27 cents a pound. More efficient recovery of base metals thus became one of the pressing problems of the past seven years.

Within this seven-year period flotation as an adjunct to cyanidation was adopted by many well-known mills throughout the world. Seven ways of combining flotation with cyanidation have been recorded in these pages by Cyanamid in the past seven years.

New reagents have been developed.

Cyanamid Ore Dressing Laboratory's personnel and facilities have been increased many-fold.

These are but a few highlights of the hundreds that might be listed to mark the swift progress of the past seven years.

Quite obviously, Cyanamid does not conclude that the torch should be applied to every mill every seven years. But on the other hand it is equally obvious that in these days of ceaseless metallurgical progress every flow sheet is worthy of intensive study — every reagent set-up should be constantly reviewed.

In the development of newer methods of beneficiation it has been the privilege of Cyanamid Field Engineers and the Cyanamid Ore Dressing Laboratory to work with metallurgists in every mining field to help reduce costs or increase recoveries or both. And to provide the reagents necessary to make the newer techniques thoroughly practical for the particular ore being treated.

In your constant efforts to keep pace with progress, feel free to call upon Cyanamid Service to Metallurgy. There will be no obligation, either expressed or implied.

Among Cyanamid Reagents recently announced is Reagent 712, a water-soluble synthetic frother with certain promotor characteristics that make it a valuable secondary promotor in the flotation of base metal, precious metal and non-metallic ores. We will be pleased to send information and samples on request.

COMPANY
Chemical Service
NEW YORK

American Cyanamid Company
30 Rockefeller Plaza, New York, N. Y.

Please send information on Reagent 712.

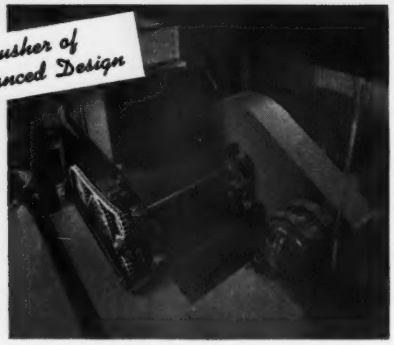
Name .....

Street and Number .....

City and State .....

SOME IDEAS FOR PROMOTING OPERATING EFFICIENCY

A Crusher of Advanced Design



● Type "C," 2-roll, chain drive crusher. The large capacity with limited degradation inherent in 2-roll crushers, and ease of adjustability for regulating the size of the product, characteristic of single-roll crushers, are combined in this one sturdy, compact unit.

Removing the "Fines" on the Loading Boom

● The Link-Belt rescreening loading boom automatically removes any degradation-fines from sized coal before delivery to railroad cars or motor trucks. Only clean, sized, picked coal is loaded. It can also handle run-of-mine coal when desired, loading all of it into the car or truck.

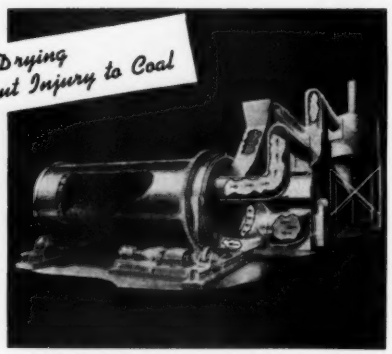
No Lifting From This Picking Table

● The Link-Belt reciprocating type picking table assures maximum efficiency and permits easy removal of heavy refuse over the sides. This illustration shows a three-compartment slack conveyor immediately below the picking table. Various forms of conveyors can be used to work in conjunction with this modern type of picking table.

Combination Trough and Jig Washing

● For large tonnages which would involve the use of more than one washing unit, Link-Belt has developed the trough washer, for use in combination with Link-Belt Simon-Carves washeries. This combination system, without loss of efficiency, saves initial cost, occupies a much smaller building, uses less power and requires less maintenance.

Heat Drying Without Injury to Coal



● High volatile coals can be safely heat-dried by the Roto-Louvre Dryer without exposing them to the danger of devolatilization and pre-oxidation. Evaporation is so efficiently accomplished—the coal being dried is retained in the presence of heat for so short a time, that its temperature is kept low.

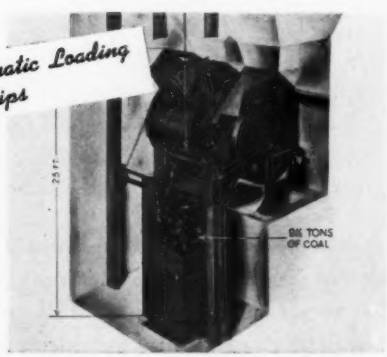
36% Greater Yardage on Stripping Operation

● This Link-Belt Speed-o-Matic hydraulic-pressure-control dragline, with 2-yard bucket, moved 36% more over-burden and coal than a mechanical-lever operated machine of same size in the same time.

One-Man-Operation Dumping Station

● This underground view is of a Link-Belt electrically controlled mine car feeder and rotary dump, which handles 10-ton mine cars. Uniform handling of cars, uniform dumping and continuous movement of haulage locomotives are accomplished. There is no need of setting brakes or spragging mine car wheels. One man controls the complete operation.

Automatic Loading of Ships

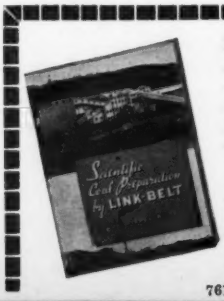


● One of two 9¼-ton capacity Link-Belt automatic-type loaders which have greatly increased hoisting capacities at an Illinois mine. With manual loading previously employed, dust from falling coal, cut off attendant's vision with the result that at times buckets were not filled and at other times overflowed, spilling tons of coal which had to be removed at considerable expense.

Slope Conveyor Doubles Capacity

● By dumping on the bottom and conveying coal and rock out of the mine with this Link-Belt belt conveyor, an Illinois operator more than doubled hoisting capacity and at the same time reduced handling costs.

LINK-BELT
HANDLING AND PREPARATION
EQUIPMENT



SEND FOR THIS BOOK OF COST CUTTING IDEAS!

62 pages of illustrations and descriptions of many of the country's outstanding coal preparation plants. Many practical cost-reducing product-improving suggestions. Ask for No. 1655. Address: Link-Belt Company, 300 W. Pershing Road, Chicago, or any of our other offices, located in principal cities.

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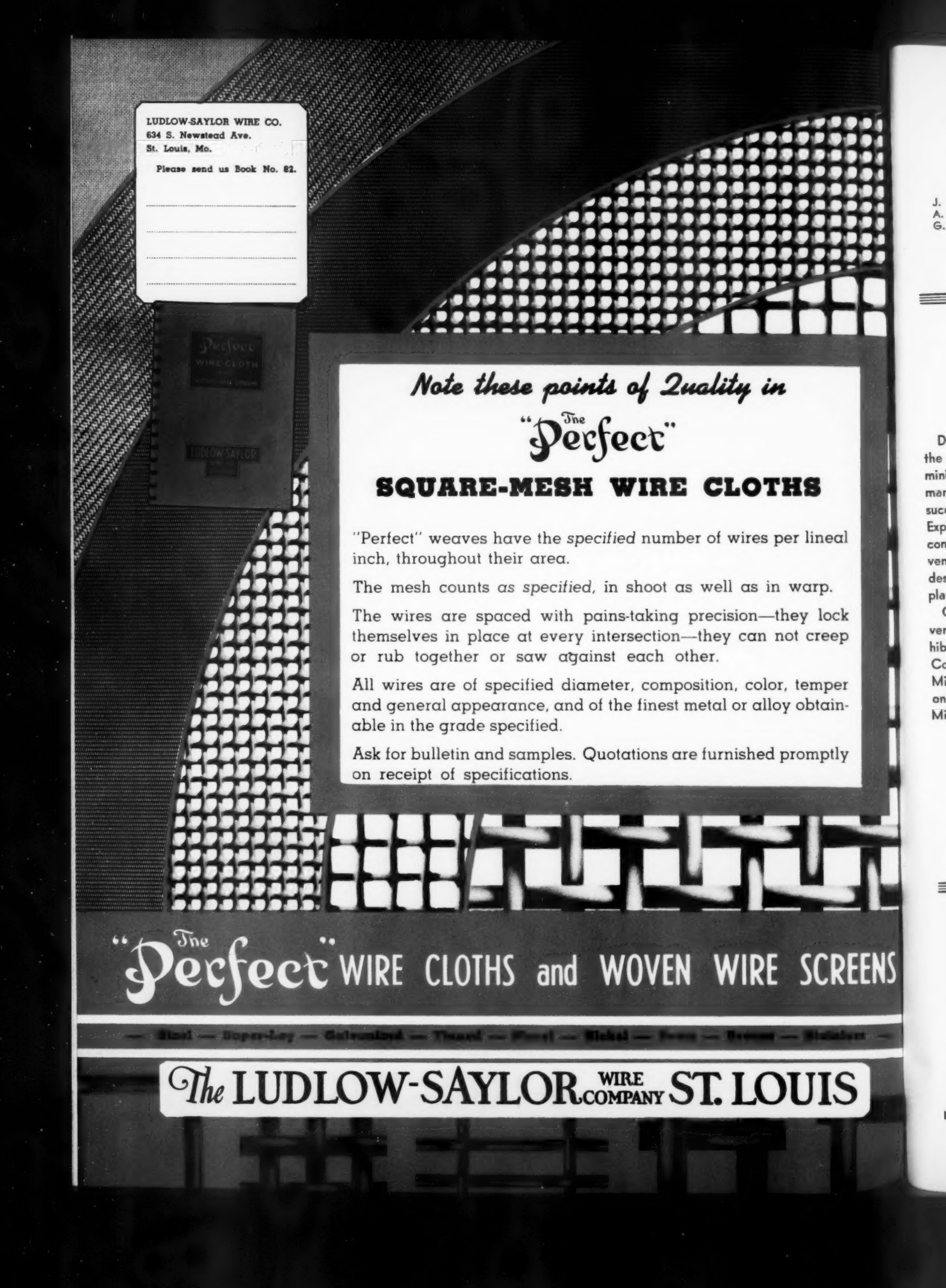

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"The Perfect"

SQUARE-MESH WIRE CLOTHS

"Perfect" weaves have the *specified* number of wires per lineal inch, throughout their area.

The mesh counts *as specified,* in shoot as well as in warp.

The wires are spaced with pains-taking precision—they lock themselves in place at every intersection—they can not creep or rub together or saw against each other.

All wires are of specified diameter, composition, color, temper and general appearance, and of the finest metal or alloy obtainable in the grade specified.

Ask for bulletin and samples. Quotations are furnished promptly on receipt of specifications.

"The Perfect" WIRE CLOTHS and WOVEN WIRE SCREENS

— Steel — Super-Loy — Galvanized — Tinned — Plated — Nickel — Brass — Bronze — Stainless —

The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS

MINING CONGRESS JOURNAL

Vol. 25 MAY, 1939 No. 5

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Despite existing conditions in the industry, more than 3,700 coal mining men and allied equipment manufacturers attended the highly successful Coal Convention and Exposition held in Cincinnati. A comprehensive report of the convention proceedings and a brief description of the equipment displayed will be found in this issue.

Complete reports of the convention papers, descriptions of exhibits, as well as reports of the Coal Division of the American Mining Congress, can be secured only in the 1939 Yearbook on Coal Mine Mechanization.

Order your copy now.

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CONTENTS

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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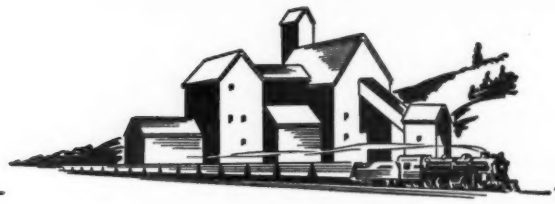

A New Declaration Of Independence

"I have taken the position that any unemployed citizen of Kentucky or any citizen of America who needs and wants and has an opportunity to work at wages and under conditions acceptable to him shall have the right to work without intimidation, free from molestation from anyone."

THESE were the words of Governor A. B. (Happy) Chandler of Kentucky as he announced his intention that unless the mines of eastern Kentucky were in operation by Monday he would send in National Guardsmen to protect miners wishing to work.

If every governor in every state in the Union would take this position, then indeed would the "right to bargain" collectively or individually be reinstated.

Under such conditions, only, is government justified and individual liberty guaranteed.

This new "Declaration of Independence" is most encouraging as we witness the demand of one branch of organized labor that the right of another branch to continue its organization shall be forfeited, and that its members shall be coerced and their much talked-about right to bargain without interference shall be abolished.

The nation's right to maintain the free flow of commerce is defiantly prohibited by the leaders of a minority in order that the right of a smaller minority to organize shall be denied and that denial be made effective by the nation as the price of its liberty to function.

Is a nation of 125 million people free when it must take orders from less than one-half million and have the machinery of its existence paralyzed until unlawful demands are met?

So long as organized labor insists on its claim of a right to control the employing wealth of the country it is un-American and destructive of the democratic fundamental principle of equal rights to all.

Coal mining is the most important industry in a large number of States.

Its markets have been and are being curtailed by competing fuels, and by increasing costs of production, partly because of higher wages but more on account of the weakening of management control.

The coal industry, both operators and miners, might well devote their joint efforts to protect the industry from such competition by steps designed to reduce costs of production.

No greater boon to the industrial prosperity of the nation can be conceived than the consumption of 500 million tons of coal annually instead of the 300 million tons which now find market.

No one step would promise more, in this behalf, than the adoption by the governors of all the coal-producing States of the new declaration of independence following the lead of Kentucky's fearless governor.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 25 MAY, 1939 No. 5

Richard J. Lund, Editor

CHANGE THE LAW

AMONG the people of the far western states of our country there has come down from the pioneer days a feeling of the highest respect for federal law. This respect is a heritage from the days of law enforcement by garrisoned troops and by the territorial federal marshals. Even the ill-fated prohibition law and the National Recovery Act fiasco have not shaken the esteem in which the citizens of the Rocky Mountain States have held their National Government.

So it was that when the United States Congress in June, 1938, passed the Fair Labor Standards Act, which became effective October 24 of that year, the employers of the West, including the management of mining enterprises both small and large, entered in good faith upon their efforts to comply with the law. The result has brought a deep feeling of resentment on the part of workmen and managements, and this extends to everyone in the mining communities who is dependent upon the operation of the mines for a living.

Senator Pat McCarran, of Nevada, when campaigning for the November, 1938 elections found the feeling running so high in his state that he brought it to the attention of the Senate on January 28, saying in part as follows:

"The Wages and Hours Law in America has created a sectionalism which will destroy the Wages and Hours Law unless the law is modified. It will destroy the law in no uncertain terms. Why? Because the pay check of the fellow who delves 5,000 feet below the surface of the earth in my section of the country has been reduced under the Wages and Hours Law. Today he is up in arms, and during the campaign he challenged me because I supported the Wages and Hours bill. He said to me, 'Because you supported the Wages and Hours bill, I am going to vote against you, because to me it meant $30 off my pay check last month.' Some who have not gone through the campaign may think about the question for the next campaign. We have miners who work 6 days a week, 8 hours a day. They do not want to have their hours limited, but their hours are limited by force of law. They do not want those hours limited, because they have nothing to do with the hours of idleness. They cannot go anywhere. They cannot do anything. They are simply idle. What is more than that, our metalliferous mines work three shifts of eight hours, which means continuous operation throughout the entire 24 hours of the day. We have destroyed that whole program and we have reduced the pay check of the miner."

The appearance of Senator McCarran's remarks and of similar comments by Senator Wheeler, of Montana, in western newspapers brought forth a letter from the Wage-Hour Division, Department of Labor, to the American Mining Congress in which the maximum hours provisions of the Act were indicated as being flexible, and examples were cited of methods whereby this flexibility could be applied in mine operation. This letter and the reply to it by the Secretary of the American Mining Congress were sent to representative mining men throughout the country, with the result that a large number of replies were received in a very short time. From Alaska to Arizona and eastward the application of the law was vigorously protested and the alleged flexibility in its provisions was refuted and the hardships which it entails were described by men responsible for the operation of mining properties in a safe and efficient manner. To cite only two of the many protests submitted:

"I feel sure the small mines of Arizona, and the men working in the small mines, would agree almost unanimously that the Wage and Hour Law has failed in its purpose and that, if mining is to continue, drastic changes will have to be made before it is too late. It can be stated without any reservation that those who are employed in mines and metallurgical plants of the Rocky Mountain region do not want their right to work 6 days per week to be interfered with by governmental rules and regulations and, above all, they do not want to be compelled to loaf two days per week."

"It (the Act) ignores extraordinary climatic and geographic conditions of the mining industry of western states where many operations are above 7,000 feet and often above 10,000 feet in elevation. They are commonly remote from centers of population. High altitude work imposes special physical and nervous strain. The custom through the years has developed among high altitude employes of applying themselves to periods of continuous work followed by rest periods at lower altitudes. The law unintentionally penalizes many people. We pray for such exemptions as may permit the continuance of high earnings and the established healthful routine of life."

With a full realization that corrective measures are needed, it is greatly to be hoped that the Congress in amending the Wage-Hour Act will take cognizance of the harm that is being done to the mining industry and to its workmen through the operation of an unwise law.

Some Factors Affecting Results When AIR CLEANING Fine Coal*

● ***Effect of Design, Construction and Tonnage Handled of Greatest Importance in Relation to Results Obtained at Negley Plant of Pittsburgh Coal Company***

By D. H. DAVIS
Chief Chemist, Pittsburgh Coal Co.

V. D. HANSON
Asst. Preparation Engr., Pittsburgh Coal Co.

THIS paper constitutes a summary of operating conditions and results obtained when air-cleaning minus ⅜-inch and minus 5/16-inch coal at the Champion No. 6 Preparation Plant of the Pittsburgh Coal Company at Negley, Ohio. The effect of design, constructure and tonnage handled in their relation to the results obtained is shown to be of greatest importance. Operating practice, changes made in the coal cleaning units, and results obtained therefrom are described.

Champion No. 6 Preparation Plant, as originally constructed and operated, was set up for wet-washing the ⅜-inch by 4-inch coal in a three box Rheolaveur launder, hand picking the plus 4-inch coal and by-passing the minus ⅜ inch uncleaned. The plant was designed to handle 325 tons of run of mine coal per hour. The raw coal was dumped from railroad cars into a track hopper, handled through the plant and loaded on one or more of four loading tracks.

Due to an increase in the ash content of the minus ⅜-inch coal it became necessary to clean this product. Air cleaning was selected because it was believed that reasonable cleaning efficiency could be obtained down to the 14 mesh size and the advantage of lower moisture more than offset lower cleaning efficiency below 14 mesh as compared to wet-washing.

The Stump Air-Flow Units, built by Roberts & Schaefer Company, were chosen because the problem of dust collection was simpler, and a higher tonnage per square and cubic foot of building space could be obtained by using this unit.

The Stump Unit

The Stump Air-Flow Unit (Fig. 1), consists of a stationary perforated deck with a slope of 2¼ inches per foot, set over a pack of clay marbles 8 inches thick at the feed end and 3 inches at the discharge end. The plenum space underneath the deck is tightly enclosed and connects with other units to a common plenum chamber of the pressure fan. The upper side walls (above the pack) are formed by glass plates up to about one foot above the deck plate, and the exhaust hood completely encloses the top of the unit. The discharge end of the unit is provided with an inspection door, and the feed end connects to the feed bin by means of a fixed housing that encloses a reciprocating type feeder.

A pulsating air current, produced by a flutter valve, passes through the marble pack and perforated deck plate, the marbles creating a fixed resistance to the flow of the air. A square mesh wire screen cloth, known as the zoning plate, is suspended by steel rods to within 1 to 3 inches of the deck, and attaches to the feeder plate which reciprocates through a 1-inch stroke. A four-speed motor operates the feeder (and also the zoning plate) and provides a variable control on the input of each unit. Originally the zoning plates were punched plate with elongated holes, but these have been replaced by wire cloths with openings from 1½ to 3 inches square.

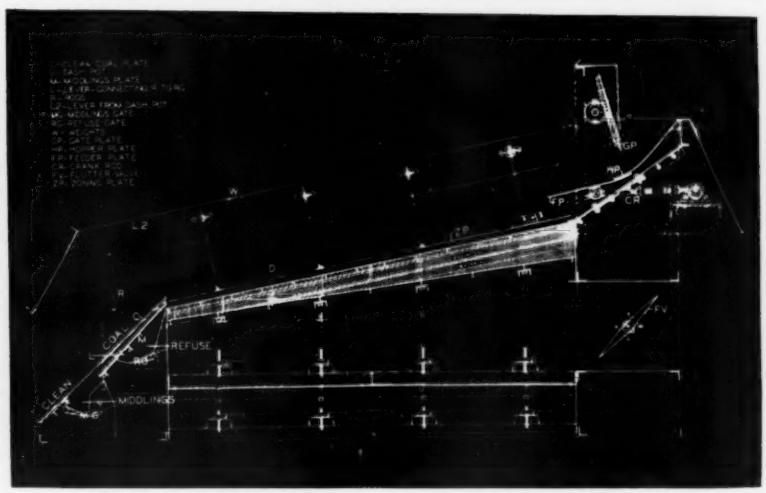

Fig. 1—Stump air-flow cleaner, cross-section of 4 ft. x 8 ft. unit (before improvements)

* Presented to 16th Annual Coal Convention of the American Mining Congress, Cincinnati, Ohio, April 24, 1939.

The minus ⅜-inch or 5/16-inch raw coal is fed evenly from the bin onto the upper end of the deck, and the pulsation of the air current produces a jigging action in the coal bed. The entire bed moves down the slope toward the discharge end and is aided in this movement by the reciprocating zoning plate. For this plant the thickness of the bed at the feed end is approximately 3 inches and at the discharge end about 7 inches. With a sufficient amount and a proper distribution of the pulsating air current, stratification takes place, with the slate and pyrite forming the lowest stratum above the bottom of the deck, in the shape of an elongated wedge with the thickest part of the wedge at the discharge end. The clean coal, being of lighter gravity, accumulates in a stratum above the heavier slate and pyrite.

Simultaneously there is a size classification which causes a large part of the minus 14 mesh to collect on top of the clean coal, and the dust (mostly minus 48 mesh material) to be drawn into the dust collector system by the exhaust fan. The heaviest refuse particles of the 14 by 48 mesh size accumulate in the bottom stratum along with some of the largest coal particles of roughly cubical shape. The strata of the clean coal and fines move more rapidly down the inclined deck and pass into the clean coal over the edge of the clean coal plate (designated C in Fig. 1). This edge is 3 to 4 inches above the deck.

The lower stratum, composed mostly of refuse and middlings, moves at a much slower rate and is discharged underneath the clean coal plate. The discharge of middlings and refuse from the units as originally operated, was from middling and refuse gates which were actuated by the air pressure under the marble pack. This method of discharging refuse was found to be unsatisfactory, due to difficulties of regulation, and rotary valves equipped with a positive and variable speed control were installed in their place. Figure 2 shows a cross-section of the latest unit and illustrates the manner of removing refuse and middlings by the rotary valves.

Layout of the Plant

The air plant consists of three primary units operating in parallel (Nos. 1, 2 and 3), and one secondary or re-cleaning unit (No. 4). Each of these units is 8 feet long and 4 feet wide. The primary units discharge two products, clean coal and a combined primary refuse and middling product. The clean coal produced by these units usually comprises 75 percent or more of the original raw coal feed. The combined primary refuse and middling product from the primary units, together with the middlings from the secondary unit pass into an 11-inch Redler elevator which raises these to a by-pass chute from where the products can be passed into a 25-ton secondary surge bin or, as in the usual circuit, onto the middlings screen, an Allis-Chalmers 4 by 10 feet horizontal vibrating screen. The middlings screen has a 5/16-inch screen opening when the feed to the plant is minus ⅜ inch, and either a ¼-inch or a 5/16-inch screen opening when the plant feed is minus 5/16 inch.

The middlings screen oversize is conveyed on the return run of the minus ⅜ inch raw coal conveyor to the Rheo launder where the coal from the oversize middlings is recovered. The middlings screen undersize goes into the secondary surge bin and from there to the secondary unit where it is recleaned. This unit differs from the primary one in that it discharges three products, namely, clean coal, middlings and final refuse (minus 5/16 inch or ¼ inch). The secondary middlings are recirculated back into the feed to the secondary unit in the manner described above. It is also possible to recirculate the middlings screen oversize back into the raw coal feed, but with such a flow it would be necessary to remove refuse from one of the primary units in order to discharge the plus 5/16 inch refuse from the plant. The dust drawn up from the units is precipitated in the cyclones and bag collectors and added to the clean coal.

The size limits of the feed to the secondary unit are narrowed down in

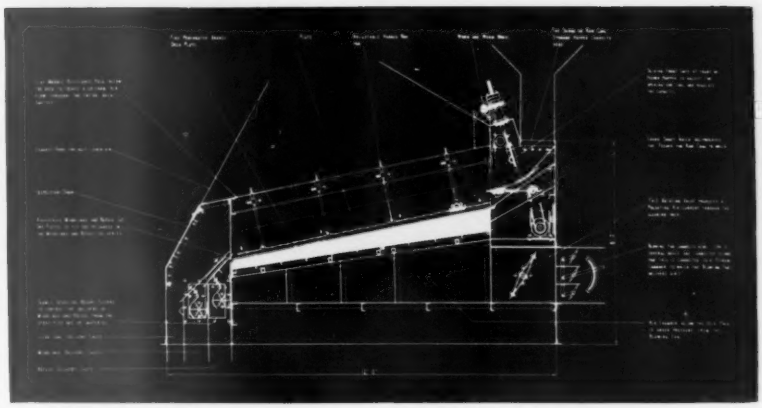

Fig. 2—Stump air-flow cleaner, cross section of 6 ft. x 8 ft. unit (with improvements)

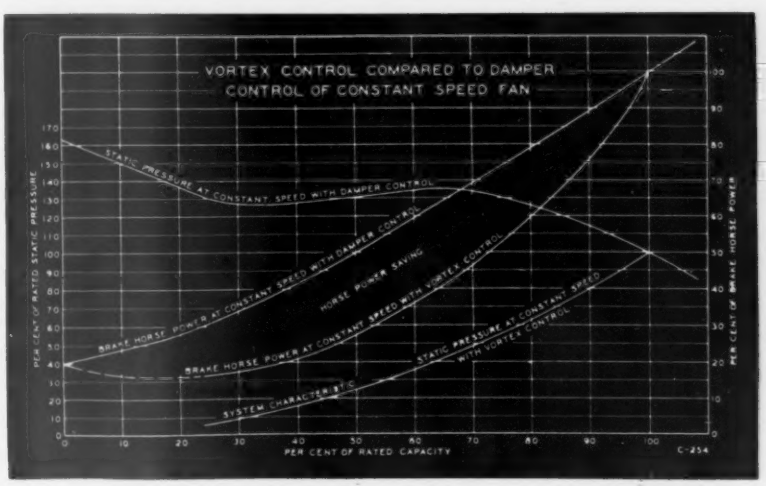

Fig. 3—Vortex control compared to damper control of constant speed fan

order to separate more effectively. The size classification in the primary units causes a high percentage of minus 14 mesh material to overflow into the clean coal, and the exhaust lifts the dust (mostly minus 48 mesh) into the collectors, so that the feed to the secondary unit usually contains a low percentage of minus 14 mesh material.

Air

Both the pressure and the exhaust fan are equipped with Vortex type controls which are regulated from the operating floor. With the fan operating at constant speed, the Vortex permits close regulation of the volume and pressure from peak output to the smallest probable demand. It is highly efficient and does not waste power at reduced volumes as does a slide damper. With variations of the raw coal moisture, control of air quantity and pressure is necessary. This is accomplished by changing the opening of the Vortex on the pressure fan without changing the dampers under each individual unit. The graph in Figure 3 shows a comparison of Vortex and damper control.

The dust collection system consists of four 8-foot diameter cyclones which settle the coarser dust and four units (in one) of Blaw-Knox flat-roof bag collectors to recover the fine dust from the exhaust of the cyclones. The air passing through the coal bed plus approximately 33 percent additional relief air (which is taken in through relief ducts) is separated from the dust in the cyclones and bag collectors. The exhaust fan discharge to the atmosphere is free of any visible dust or haze. The experience from using the standards set up by the coal company as to the use of 8-foot diameter cyclones and the bag collector results in a bag collector product of 98 percent minus 200 mesh material.

The operating control panel is equipped with water gauges which are connected with copper tubing to various points where indication of static air pressure is desired; ammeters show loads on the motors of the fans and main conveyors. Water gauge connections are available for measuring the Plenum pressure, the under-pack pressure of each unit, the negative or exhaust pressure over each unit (taken just below the transformation from hood to collector duct), the negative pressure at the inlet and outlet of the bag collectors, and the negative pressure at the intake and exhaust ends of each cyclone.

The water gauge readings provide the operator with information necessary to maintain a close control over the factors affecting the cleaning performance. Air cleaning depends chiefly on maintaining as constant as possible the conditions found to give the best results. Changes in input tonnage and moisture of the raw feed are compensated by making the necessary adjustments to meet the changing conditions.

The Vortex control is located at the side of the water gauge panel so that changes in pressure may be noticed with changes in the Vortex opening. Both exhaust and pressure fans are normally operated with the Vortex about two-thirds open. Under these conditions enough reserve fan capacity is maintained to meet any requirements, with the exhaust fan having excess capacity for any pressure fan setting.

The amount of air to each unit was originally controlled by a butterfly damper, but this was effective through only a small part of its range. To improve air distribution and to maintain a more effective air control, three-part Louvre dampers were installed in place of the butterfly dampers. A more improved air control through the damper opening was obtained.

The usual water-gauge readings are shown in Table 1.

With the Plenum water gauge at 7.0 inches and the usual damper settings at the units, the measurements of air pressure and volume were taken and their magnitude is shown in Table 2.

Feeding Bins and Units

A 25-ton storage bin is located above each unit for leveling out the fluctuations in the tonnage of raw coal before reaching the units. Other means of holding an even feed are provided by having bin indicators at high and low levels in the bins with signal lights on the operating floor, feeders equipped with 4-speed motors and controls, and rack and pinion gates at the feeders. The bin indicators inform the operator of the approximate amount of raw coal in each bin. The 4-speed feeder control, and rack and pinion gates enable the operator to regulate the tonnage to each unit so that an even rate of feed is maintained. These provisions are vital factors in controlling results from air cleaning units. The feeder speeds are 94, 155, 205, and 310 r.p.m., and are usually operated at the second speed. If a lower range of speed is needed, it may be obtained by a change of sprockets on the speed-reducer. The switches for changing the speed of the feeders are located on the operating control panel along with the Vortex controls, bin indicator lights, water gauges, ammeters, and the push-button switches for the other plant equipment.

One of the first tests made was to determine whether size segregation was occurring in the bins. The product from each foot of the clean-coal-discharge from the units was screened, and it was found that there was very close size distribution in each of the one foot sections, indicating that there was little segregation occurring in the bins.

Moisture

Raw coal to the plant is shipped by barge and rail, and is in transit for three or four days so that the surface

TABLE 1—Water Gauge in Inches

	Pressure plenum	Pressure under pack		Negative pressure Over units		
		No. 1, 2, 3 units	No. 4. unit	No. 1, 2, 3, 4 units	Bag collectors Inlet	Outlet
Coal on	6.8-7.0	3.2-3.6	3.7	0.2	1.8	3.3
Coal off	5.7	1.6	2.0	0.2	1.8	3.3

TABLE 2—For Stump Air-Flow Units

Pressure over units, inches water	0.2 Neg.
Loss through risers, inches water	1.4 Neg.
Loss through cyclones, inches water	1.3 Neg.
Loss through bag collector, inches water	1.5 Neg.
Loss through ducts from cyclones to bag collector and from bag collector to fan, inches water	1.1 Neg.
Total negative pressure at intake to exhaust fan, inches water	5.5
Quantity of air to 4 units, cubic feet per minute	32,500
Quantity of make-up air, cubic feet per minute	10,000
Total exhaust air for 4 units, cubic feet per minute	42,500
Horse Power (exhaust fan)	73
Air velocity in ducts, feet per minute	3,100 to 3,400
Quantity of air pressure fan to 4 units, cubic feet per minute	32,500
Plenum static pressure, inches water	7.0
Horse power (pressure fan)	53

moisture of the coal depends, in a large measure, upon weather conditions during the period in transit. The total moisture of the minus ⅜-inch raw coal varies from 4.0 to 7.5 percent for an individual day's average. This coal contains between 2 and 3 percent bed moisture, the balance being surface moisture. There is, at times, a considerable variation in moisture in the coal from the same barge. Also, when the plant was first started, coal from two mines was being dumped with frequent changes from one coal to the other. The minus ⅜-inch coal from each mine was practically identical in size and separation characteristics, but differed by about 1.0 percent in surface moisture. A variation in moisture affects the operation of the air plant, principally in the rate of feed from the bins and in the amount of water gauge pressure necessary to pass the same amount of air through the bed and thus produce the same action in the coal bed. Coals with 6 to 7.0 percent total moisture have been successfully cleaned in this plant at lower tonnages with only a slight decrease in the efficiency of separation. The performance of the air plant has been most consistent at a total moisture of about 4.5 to 5.0 percent.

Width of Units

Previous to the installation of this plant the Stump Air-Flow Units had been built from 18 inches to 3 feet in width by various lengths up to 8 feet long. In order to increase the tonnage per unit, an extra foot was added to the width of each unit, thus increasing the capacity approximately 33 percent over that of the 3-foot units. Construction costs for a given tonnage were decreased by the additional width, due to savings in unit machinery and material handling equipment as well as the size of the structure. Operating results indicate that coal cleaning results in the 4-foot units are at least equally as good as in the 3-foot units, and that a further increase in width to 6 feet should prove even more economical in construction costs without change in operating results. This latter prediction has been recently confirmed at another plant by test results on the operation of units 6 feet in width. (See Table 7.)

While operating with an extremely wet cargo the holes in the first 2 or 3 feet of the perforated deck plate were completely plugged, and no air passed through the holes in this area. Before there was an opportunity to clear the holes, raw coal at the usual moisture was fed to the plant. Although it was difficult to move the coal over the "dead" area, the cleaning results were not materially affected. This indicates the possibility of shortening the units and making even more economies in construction with little effect on the results obtained.

Changes to Units

The original method of removing refuse and middlings was by gates actuated by the pulsations of air pressure under the marble pack (see Figure 1). A dash-pot consisted of a float in a bath of water or oil with a pipe connecting from the plenum under the marble pack extending under the float. The float was connected to a lever controlling the discharge of the gates. A build-up of refuse on the deck was supposed to increase the pressure under the pack, cause the float to rise and move the lever, thus discharging the middlings and refuse gates. A spring and weight connected to the lever were used to balance the weight of the middlings and refuse on the gates.

Actually the discharge of the refuse and middlings was not automatic, the products discharged were most irregular in quantity and amount of 1.60 specific gravity sink, and the continual attention of the operator was necessary. Slight changes in raw coal moisture affected the quantity and character of the material discharged. After a few weeks of operation the middlings gates on the primary units were disconnected and the primary refuse and middlings removed as a combined product from the refuse gate. The lever arrangement on the dash-pot was simplified to allow a continuous discharge of refuse and middlings, but, although an improvement over the original hook-up, it was still unsatisfactory. In order to obtain a positive and, at the same time, a variable control over the refuse removed a 4 inch diameter rotary valve with a variable speed drive was connected to the refuse discharge of the secondary unit. On one primary unit a 6 inch diameter rotary valve has replaced the dash-pot and gate arrangement, and provides the necessary control for regulating the quantity and character of the refuse and middlings product. Rotary valves are now being installed on the other primary units and on the secondary middlings discharge. When these changes are complete, the operation of the secondary unit should be improved due to a more steady input tonnage and a more constant character of the feed.

Replacement of the punched zoning

TABLE 3—Summary of Gravity Separation on Plus 14 Mesh Size of Air Plant Products at Various Input Tonnages

Coals A, B, and C

Coal	Size of raw coal feed	Plant input tons per hour	Primary units tons per hour per foot of width	Percentage of 1.60 sink—plus 14 mesh: Raw coal	Primary clean coal	Secondary clean coal	Final clean coal	Final refuse
A	—3/8 inch	75	6.3	5.9	1.8	2.0*	2.1	76.5*
A	"	110	9.2	6.8	2.6	4.6*	2.8	87.3*
A	"	135	11.3	6.7	2.8	4.9*	3.1	91.1*
B	—5/16 inch	75	6.3	4.8	0.6	1.7	1.0	78.9
B	"	110	9.2	4.1	..	..	1.4	84.4
C	"	120	10.0	7.2	1.8	4.1	2.5	76.4

* Minus 5/16 inch.

TABLE 4—Summary of Removal of Plus 14 Mesh 1.60 Sink

Coals A, B, and C

Coal	Size of raw coal feed	Plant input tons per hour	Primary units tons per hour per foot of width	Percent removal of plus 14 mesh 1.60 sink: Primary clean coal	Final clean coal
A	—3/8 Inch	75	6.3	69.5	64.4
A	"	110	9.2	61.7	58.8
A	"	135	11.3	58.1	53.7
B	—5/16 Inch	75	6.3	87.5	79.1
B	"	110	9.2	..	65.8
C	"	120	10.0	75.0	65.3

piate by a square mesh screen cloth was another change which contributed to better operating results. This gave more action in the bed due to a higher percentage of open area in the zoning plate and a decreased tendency of damp coal to blind the openings in the zoning plate. With the punched plates, the blinding of the openings at the feed end prevented the coal from reaching the deck and a loss in air pressure occurred along the sides and under the blinded area. Square mesh cloth with openings less than 1½ inches also blinded when handling wet coal, but openings of 2 to 3 inches remained open even while running coal of 7.0 percent total moisture.

Stainless steel edges, cut at a 60° bevel to the horizontal, were fastened to the splitting edge of the clean coal plate in order to reduce the tendency of any damp material to cling at that point and to make a sharper cut into the bed at the discharge.

All these changes have been incorporated in the design of the latest Stump Air-Flow Cleaner, 6 feet in width, shown in Figure 2.

TABLE NO. 5

SIZING AND GRAVITY SEPARATION CHARACTERISTICS OF AIR PLANT PRODUCTS

COAL A - MINUS 3/8"

MATERIAL	SIZE IN INCHES & MESH	135 TONS PER HOUR - INPUT				110 TONS PER HOUR - INPUT				75 TONS PER HOUR - INPUT			
		PERCENTAGE OF MATERIAL (a)	PERCENTAGE OF SIZE	1.60 FLOAT PERCENT WEIGHT	1.60 SINK PERCENT WEIGHT	PERCENTAGE OF MATERIAL (a)	PERCENTAGE OF SIZE	1.60 FLOAT PERCENT WEIGHT	1.60 SINK PERCENT WEIGHT	PERCENTAGE OF MATERIAL (a)	PERCENTAGE OF SIZE	1.60 FLOAT PERCENT WEIGHT	1.60 SINK PERCENT WEIGHT
Raw Coal (feed	-3/8"	100.0	100.0			100.0	100.0			100.0	100.0		
	3/8" x 4Mm		89.5	92.5	7.5		91.0	93.0	7.0		91.0	93.8	6.2
	5/8" x 14M		73.0	93.3	6.7		75.0	93.2	6.8		75.5	94.1	5.9
	14 M x 48M		16.5	89.3	10.7		16.0	91.9	8.1		15.5	92.6	7.4
	- 48 M		10.5				9.0				9.0		
Primary Clean Coal (3 units)	-3/8"	80.0	100.0			83.0	100.0			79.0	100.0		
	3/8" x 4Mm		91.0	95.7	4.3		93.0	96.5	3.5		93.0	97.4	2.6
	5/8" x 14M		68.5	97.2	2.8		73.0	97.4	2.6		73.0	98.2	1.8
	14 M x 48M		22.5	91.0	9.0		19.0	93.0	7.0		20.0	93.7	6.3
	- 48M		9.0				8.0				7.0		
Primary Middlings & Refuse (3 units)	-3/8"	17.0	100.0			14.0				18.0			
	3/8" x 4Mm		84.5	17.4	82.6								
	5/8" x 14M		57.0	71.7	28.3								
	14 M x 48M		1.5	40.0	60.0								
	- 48M		1.5										
(b) Primary Middlings & Refuse to Rhec	3/8" x 5/16"	6.0		84.0	16.0	4.0				5.0			
Secondary Feed (Incl. Sec. Middlings Recirculation)	-5/16"	21.0	100.0			20.0	100.0			25.0	100.0		
	5/16" x 4Mm		38.5	81.9	18.1		38.5	73.9	26.1		39.0	83.2	16.8
	5/16" x 14M		57.0	82.2	17.8		57.0	74.2	25.8		57.5	83.5	16.5
	14 M x 48 M		1.5	43.0	57.0		1.5	51.9	48.1		1.5	50.0	50.0
	- 48 M		1.5				1.5				1.0		
Secondary Clean Coal	-5/16"	6.8	100.0			7.9	100.0			11.1	100.0		
	5/16" x 4Mm		35.0	94.6	5.4		33.0	95.2	4.8		29.0	97.2	2.8
	5/16" x 14M		30.0	95.1	4.9		31.5	95.4	4.6		25.0	98.0	2.0
	14 M x 48 M		2.0	85.0	15.0		1.5	85.4	14.6		4.0	80.0	20.0
	- 48 M		2.0				1.0				1.0		
Secondary Middlings (Recirculation)	-5/16"	10.0	100.0			10.0				12.0			
	5/16" x 4Mm		37.5	82.3	17.7								
	5/16" x 14M		36.0	83.0	17.0								
	14 M x 48 M		1.5	35.0	65.0								
	- 48 M		2.5										
Final Refuse (Secondary)	-5/16"	2.2	100.0			2.1	100.0			1.9	100.0		
	5/16" x 4Mm		37.5	8.6	91.2		38.5	12.5	87.5		39.0	23.1	76.9
	5/16" x 14M		34.5	8.9	91.1		37.0	12.7	87.3		37.0	23.5	76.5
	14 M x 48 M		3.0	5.5	94.5		1.5	0.0	100.0		2.0	5.0	95.0
	- 48 M		2.5				1.5				1.0		
Cyclone Product		1.0	100.0			1.0				1.0			
	14 M x 48 M		10.0										
	48 M x 100M		46.0										
	- 100 M		44.0										
Bag Collector Product		(c)	100.0			(c)				(c)			
	100 M x 200 M		2.0										
	- 200 M		98.0										
(d) Final Clean Coal	-3/8"	91.8	100.0			93.9	100.0			93.1	100.0		
	3/8" x 4Mm		89.5	95.0	5.0		89.5	96.3	3.7		89.5	97.1	2.9
	5/8" x 14M		66.0	96.9	3.1		71.5	97.2	2.8		70.5	97.9	2.1
	14 M x 48M		22.5	89.6	10.4		18.0	92.6	7.6		19.0	93.7	6.9
	- 48 M		11.5				10.5				10.5		

(a) The percentage weight of material given is the approximate percentage of raw coal feed to the plant.

(b) With a minus 3/8" Raw Coal the Primary Middlings & Refuse is screened over a 5/16" vibrating screen, the oversize going to the Rheolavour Plant and the undersize going to the secondary unit.

(c) Amounts to approximately 0.5 ton per 7 hour shift.

(d) Includes Primary Clean Coal, secondary clean coal, and cyclone product.

Regulation

The quantity of air through the coal bed is regulated by the Vortex to the pressure fan as well as the air valve or damper at the unit which distributes the air between the various units. The rate of input must be held as even as possible in order to avoid making changes in the quantity or distribution of air. By careful attention, the input rate may be held fairly uniform between close limits. In addition to these factors the rate of discharge of primary refuse and middlings must be regulated. However, for a constant input with the same coal, the amount of discharge can be set by means of the rotary valves with little attention thereafter. In the secondary unit the withdrawal of final refuse at the correct rate is the most important regulation, and the rate of withdrawal depends on the depth of bed and the amount of float in the refuse.

In an attempt to determine the effect of the speed of the flutter valve on the operation of the secondary unit, a variable speed flutter valve drive was installed. The regular speed is 155 r.p.m. on both primary and secondary units. Due to the fact that the amount of middlings and refuse being discharged depended to a great degree on the number of pulsations per minute of the flutter valve (the rotary refuse valves were not installed at this time), it was impossible to make conclusive tests. However, the indications were that at 125 r.p.m. there was not enough action in the bed for making a good separation. At speeds of 165 to 200 r.p.m. there appeared to be an improvement in results, but, due to the difficulty in controlling the amount of refuse and middling discharge, the flutter valve could not be operated at speeds higher than 175 r.p.m. No data have been collected on the effect of flutter valve speed since the rotary refuse valves were installed.

The effect of varying the speed of the zoning plate from 120 to 180 r.p.m. under the same conditions of feed and input tonnage was tested on both the primary and secondary units. Results indicate that variations in this range of zoning plate speed have little effect on operating results obtained.

Results Obtained to Date (April, 1939)

Tables 5, 6 and 7 show the detailed data of sizing and specific gravity separation characteristics of air plant products for Coals A, B and C respectively, while operating at various plant input tonnages. Table 3 is a summary of these tables showing the gravity separation on the plus 14 mesh size of raw coal, clean coal, and refuse products in their relation to the input tonnage. The test on Coal C was made in another plant equipped with the latest type units with the same total capacity as the Champion No. 6 plant.

Coals designated A, B and C are all from the same seam but from different mines. Generally speaking, there is little difference between the three coals in the inherent characteristics, the principal difference being in the amount of free impurity, which depends on methods of mining. Coals A and C are very similar in amount of 1.60 specific gravity sink material in the raw coal both in the plus 14 mesh and 14 by 48 mesh sizes, and contain considerably more 1.60 specific gravity sink than Coal B. Coal

TABLE NO. 6

SIZING AND GRAVITY SEPARATION CHARACTERISTICS OF AIR PLANT PRODUCTS

Coal B - Minus 5/16"

MATERIAL	SIZE IN INCHES & TYLER MESH	110 TONS PER HOUR - INPUT: PERCENTAGE OF MATERIAL (a)	110 TONS PER HOUR - INPUT: PERCENTAGE OF SIZE	110 TONS PER HOUR - INPUT: 1.50 FLOAT PERCENT WEIGHT	110 TONS PER HOUR - INPUT: 1.50 x 1.60 PERCENT WEIGHT	110 TONS PER HOUR - INPUT: 1.60 SINK PERCENT WEIGHT	75 TONS PER HOUR - INPUT: PERCENTAGE OF MATERIAL (a)	75 TONS PER HOUR - INPUT: PERCENTAGE OF SIZE	75 TONS PER HOUR - INPUT: 1.50 FLOAT PERCENT WEIGHT	75 TONS PER HOUR - INPUT: 1.50 x 1.60 PERCENT WEIGHT	75 TONS PER HOUR - INPUT: 1.60 SINK PERCENT WEIGHT
Raw Coal (Feed)	-5/16"	100.0	100.0				100.0	100.0			
	5/16" x 48 M		67.0	93.5	0.4	6.1		65.0	98.0	1.6	4.4
	5/16" x 14 M		67.0	93.4	0.5	6.1		61.0	98.0	1.6	4.4
	14 M x 48 M		20.0	95.7	0.3	4.0		24.0	94.0	2.6	3.4
	- 48 M		13.0					15.0			
Primary Clean Coal (3 units)	-5/16"						76.0	100.0			
	5/16" x 48 M							85.5	97.8	0.6	1.6
	5/16" x 14 M							82.0	98.0	0.4	1.6
	14 M x 48 M							24.5	96.9	0.6	2.5
	- 48 M							13.5			
Primary Middlings & Refuse (3 units)							20.0				
(b) Primary Middlings & Refuse to Rhec		0.0					0.0				
Secondary Feed (incl. Sec. Middlings) Recirculation	-5/16"						30.0	100.0			
	5/16" x 48 M							89.0	89.1	2.1	8.8
	5/16" x 14 M							90.0	89.4	2.2	8.4
	14 M x 48 M							1.0	77.9	1.3	20.8
	- 48 M							1.0			
Secondary Clean Coal	-5/16"						16.8	100.0			
	5/16" x 48 M							89.0	97.2	0.6	2.0
	5/16" x 14 M							94.0	97.5	0.8	1.7
	14 M x 48 M							5.0	90.7	0.4	9.0
	- 48 M							1.0			
Secondary Middlings (recirculation)							10.0	100.0			
								29.5	90.1	1.9	7.4
								98.5	90.7	1.9	7.4
								1.0	0.2	6.3	93.5
								0.5			
Final Refuse (Secondary)	-5/16"	2.4	100.0				3.2	100.0			
	5/16" x 48 M		39.0	14.2	1.3	84.5		39.5	17.9	2.9	79.2
	5/16" x 14 M		96.5	14.3	1.3	84.4		96.0	18.2	2.9	78.9
	14 M x 48 M		2.5	8.9	1.1	90.0		3.5	7.7	0.0	92.3
	- 48 M		1.0					0.5			
Cyclone Product							4.0				
	14 x 48 M										
	48 x 100 M										
	- 100 M										
Bag Collector Product		(c)	100.0				(c)	100.0			
	100 x 200 M		2.0					2.0			
	-200 M		98.0					98.0			
(d) Final Clean Coal	-5/16"	97.6	100.0				96.8	100.0			
	5/16" x 48 M		85.5	97.5	0.4	2.1		84.0	97.6	0.8	1.6
	5/16" x 14 M		63.0	98.2	0.4	1.4		63.0	98.2	0.8	1.0
	14 x 48M		22.5	95.5	0.5	4.0		21.0	96.1	0.9	3.0
	- 48 M		14.5					16.0			

(a) The percentage weight of material given is the approximate percentage of raw coal feed to the plant.

(b) With a minus 5/16" Raw Coal there was no middling screen oversize going to the Rheolaveur Plant.

(c) Amounts to approximately 0.5 ton per 7 hour shift.

(d) Includes Primary Clean Coal, Secondary Clean Coal and Cyclone product.

A is the undersize from a 3/8-inch opening screen cloth while Coal B is the undersize from a 5/16-inch opening screen cloth, both coals screened on a Traylor vibrating screen. Coal C is the undersize from a 5/16-inch opening screen cloth on a horizontal Symons screen.

The data presented in the tables show the difference in results obtained in cleaning coals A and B at various tonnages but do not show the difference in results obtained in cleaning the two coals with the same size of raw coal. However, Coal C is so similar to Coal A in specific gravity separation characteristics that it can be used to simulate Coal A as a minus 5/16-inch product. From these data definite conclusions can be made.

Effect of Tonnage on Separation

Tests on all three coals, Table 3, show that the results obtained vary with the tons per hour of raw coal. With Coal A (minus 3/8 inch) the percent of 1.60 sp. gr. sink in the 3/8 inch x 14 mesh of primary clean coal is 1.8 percent, 2.6 percent and 2.8 percent at 6.3, 9.2, and 11.3 tons per hour per foot of primary unit width, respectively. With Coal B (minus 5/16 inch) the percent of 1.60 sp. gr. sink in the 5/16 inch x 14 mesh final clean coal is 1.0 percent and 1.4 percent at the respective tonnages of 6.3 and 9.2 tons per hour per foot of primary unit width.

The effect of tons per hour on test results is to be noted particularly on the primary clean coal rather than on the final clean coal since the amount of 1.60 sp. gr. float discharged in the final refuse and the tonnage in the secondary unit affects the amount of 1.60 sp. gr. sink in the secondary clean coal, which is a part of the final clean coal.

Tests have been made under equivalent conditions of tonnage, and feed characteristics, while varying the amounts of 1.60 sp. gr. sink in the primary refuse and middlings. The results indicated that the clean coal is not improved by withdrawing a primary refuse and middlings product containing less than approximately 15.0 percent 1.60 sp. gr. sink.

Another way to show the effect of tons per hour is by Table 4, where the percentage removal of plus 14 mesh 1.60 sp. gr. sink material is tabulated with the tons per hour of plant input and the tons per hour per foot of primary unit width. Plotting the tons per hour per foot of primary unit width against the percent removal of plus 14 mesh 1.60 sp. gr. sink for Coal A and for Coals B and C, results in a straight line curve—Figure 4. It is doubtful whether a reduction in tonnage below 6.0 tons per hour per foot of width through the primary units would materially improve the results. These data clearly show that the capacity of an air plant necessarily depends upon the type of cleaning job desired, and in order to maintain certain results the input tonnage must be carefully regulated.

With an efficient wet cleaning plant it is possible to reduce the 1.60 sp. gr. sink in the 3/8 inch x 48 mesh size to 1.0 percent, whereas with an efficient air plant most of the cleaning is above 14 mesh. In general the tonnage handled in a wet cleaning plant has a much smaller effect on cleaning efficiency than it does in an air plant.

Effect of Size on Separation

The size ratio of the raw coal has probably as much effect on results as tons per hour. Table 4 shows that at 6.3 tons per foot of width 69.5 percent of the 3/8 inch x 14 mesh 1.60 sp. gr. sink of Coal A was removed in the primary units as compared to 87.5 percent of the 5/16 inch x 14 mesh 1.60 sp. gr. sink of Coal B. For each

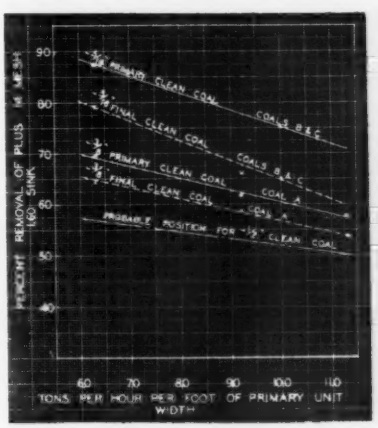

Fig. 4—Relation of percent removal of plus 14 mesh 1.60 sink to tons per hour per foot of primary unit width

tonnage the percent removal of plus 14 mesh 1.60 sp. gr. sink was considerably higher for the minus 5/16 inch raw coal than for the minus 3/8 inch raw coal. This is shown graphically by Figure 4. It should be particularly noted that the slope of the line for the minus 5/16 inch coal is greater than that of the minus 3/8 inch coal, indicating that it is easier to attain more complete removal of impurities by reducing the size ratio. The probable position of the line for minus 1/2 inch coal is interpolated from the slopes of the lines for minus 5/16 inch and minus 3/8 inch coals.

From these data it is apparent that on all three coals there was but little reduction in the percent of 1.60 sp. gr. sink in the sizes under 14 mesh. Practically all the reduction is made in the plus 14 mesh sizes and, of course, a better separation is made in the plus 8 mesh than in the plus 14 mesh. However, decreasing the top size of the raw coal from 3/8 inch to 5/16 inch resulted in a slightly greater reduction of 1.60 sp. gr. sink in the 14 x 48 mesh clean coal.

TABLE NO. 9

SIZING AND GRAVITY SEPARATION CHARACTERISTICS OF AIR PLANT PRODUCTS

COAL C - MINUS 5/16"

MATERIAL	SIZE IN INCHES & TYLER MESH	PERCENTAGE OF MATERIAL(a)	120 TONS PER HOUR - INPUT PERCENTAGE OF SIZE	1.60 FLOAT PERCENT WEIGHT	1.60 SINK PERCENT WEIGHT
Raw Coal (feed)	-5/16"	100.0	100.0		
	5/16" x 48 M		90.0	92.3	7.7
	5/16" x 14 M		69.5	92.8	7.2
	14 M x 48 M		20.5	90.6	9.4
	- 48 M		10.0		
Primary Clean Coal (2, 6 ft. units)	-5/16"	82.5	100.0		
	5/16" x 48 M		87.5	96.3	3.7
	5/16" x 14 M		61.0	98.2	1.8
	14 M x 48 M		26.5	91.9	8.1
	- 48 M		12.5		
Primary Refuse & Middlings (2 units)	-5/16"	15.5	100.0		
	5/16" x 48 M		97.0	72.2	27.8
	5/16" x 14 M		95.5	73.3	26.7
	14 M x 48 M		1.5	16.7	83.3
	- 48 M		3.0		
Secondary Feed (includes Secondary Middlings Recirculation)	-5/16"	23.5	100.0		
	5/16" x 48 M		98.0	78.1	21.9
	5/16" x 14 M		96.5	78.4	21.6
	14 M x 48 M		1.5	50.0	50.0
	- 48 M		2.0		
Secondary Clean Coal (1, 4 ft. unit)	-5/16"	11.0	100.0		
	5/16" x 48 M		98.5	95.2	4.8
	5/16" x 14 M		97.0	95.9	4.1
	14 M x 48 M		1.5	33.4	66.6
	- 48 M		1.5		
Secondary Middlings		8.0	NO SAMPLE		
Final Refuse (Secondary Unit)	-5/16"	4.5	100.0		
	5/16" x 48 M		99.0	23.4	76.6
	5/16" x 14 M		97.5	23.6	76.4
	14 x 48 M		1.5	9.1	90.9
	-48 M		1.0		
Cyclone Product		2.0			
(b) Final Clean Coal	-5/16"	95.5	100.0		
	5/16" x 48 M		89.0	96.1	3.9
	5/16" x 14 M		70.0	97.5	2.5
	14 M x 48 M		19.0	91.0	9.0
	- 48 M		11.0		

(a) The percentage weight of material given is the approximate percentage of raw coal feed to the plant.

(b) Includes Primary Clean Coal, Secondary Clean Coal and Cyclone Product.

Operation of Secondary Unit

In order to make a closer separation in the secondary unit while operating with a minus 3/8 inch plant feed, the middlings screen is equipped with a 5/16 inch screen cloth, and while operating with a minus 5/16 inch plant feed, it is possible to reduce the size of the product to the secondary unit to minus 1/4 inch. However, in some cases the screen cloth of the middlings screen is not reduced below 5/16 inch opening because of the difficulty in dewatering the 5/16 inch x 1/4 inch coal after passing through the Rheolaveur plant.

In all cases the secondary unit clean coal contains a higher percentage of 1.60 sp. gr. sink in the plus 14 mesh than does the primary units because the separation of final refuse is made in this unit. In the tests where the percentage of 1.60 sp. gr. float in the refuse exceeds 15 percent, an effort was made to produce the cleanest coal possible. In the regular operation with a minus 3/8 inch feed, the final refuse contains between 5.0 and 10.0 percent 1.60 sp. gr. float.

Conclusions

1. The operation of the Stump Air-Flow Unit, the layout of the plant, and the flow of coal has been rather fully described.

2. The design and construction have been shown to be important in their relation to results obtained.

Regulation of the plant operation is made from the control panel, which consists of all switches, signal lights, water gauge, ammeters and Vortex controls.

3. Many changes in design and construction have been made in the Stump Units originally installed, and from these a new unit has been constructed. The width of a unit is now up to six feet. The economies of this development are pointed out.

4. The plant has proven capable of operating with a raw coal moisture of 6.0 to 7.0 percent total moisture with little loss in operating efficiency, and best results are obtained at 4.5 to 5.0 percent total moisture.

5. Test results on three coals from the same seam indicate that operation results are a function of both tons per hour and the size of the raw coal. Test results also show that while operating with 6.3 tons per hour per foot of primary unit width, 69.5 percent of the 3/8 inch x 14 mesh 1.60 sp. gr. sink and 87.5 percent of the 5/16 inch x 14 mesh 1.60 sp. gr. sink was removed.

When specifying the capacity of air cleaning units, it is important to carefully state the results obtained at each tonnage. Air cleaning units may be operated merely as a conveyor in which the coal is put over a cleaning unit, removing but a small proportion of the sink material, or they may be operated as an efficient cleaner on the plus 14 mesh sizes. In order to obtain the highest efficiency the units must not be overloaded and uniform operating conditions must be maintained.

6. It has been shown that the plants operate with a small loss of 1.60 sp. gr. float coal in the refuse.

Appalachian Coals, Inc., Cincinnati, Ohio, marketing agency for coal producers of eastern Kentucky, eastern Tennessee, southwestern Virginia and southern West Virginia, has established a southeastern office in Knoxville, Tenn., with T. A. Day, assistant secretary, in charge.

This new office, according to Day, will serve the southeastern market area which is east and south of the Ohio River, including Kentucky, Tennessee, Virginia, North Carolina, South Carolina, Georgia, Florida and Alabama. The organization will thus be equipped to give better service to its constituent companies operating in this area and to their customers.

A deposit of diaspore clay in Missouri

Refractories In Non-Ferrous Metallurgical Furnaces

● ***Past Two Decades Have Witnessed Great Strides in Manufacturing Processes and Operating Procedure; Many New Products Introduced***

By J. SPOTTS McDOWELL
Harbison-Walker Refractories Co.

PROGRESS in the refractories industry has never proceeded so rapidly as during the past 20 years. New products have been developed, existing products have been improved, and scientific principles have been employed in the solution of problems connected with both the manufacture and the use of refractories. In the manufacturing processes, machine methods have been developed and extended, and firing technique has been brought to a higher degree of perfection.

Among the newer products currently finding application are included super-duty fireclay brick, several classes of high-alumina brick, refractory insulating brick, chemically bonded magnesite and chrome brick, low-iron magnesite brick, and forsterite brick. Among the changes in operating procedure resulting in improvements in existing products are these:

"Grain-sizing," or proper proportioning of grains of different sizes in the ground materials used for the manufacture of brick.

The removal of entrapped air from ground clays, before or during the forming operation, resulting in greater density and more uniform structure and size of fire-clay brick.

The increased application of power pressing.

The adaptation of the power press to the manufacture of silica brick.

Modifications in processing which have improved the behavior of magnesite and chrome brick in service at high temperatures.

The operators of metallurgical furnaces have been exceedingly alert in taking advantage of each new development in the refractories industry. They have not hesitated in making large scale service trials of newly developed materials, nor in adopting these materials as standard for their practice as experience proved their worth. Painstaking search for the materials best adapted for each particular purpose, adjustment of furnace design and construction to the desired ends, and revision of operating technique have been richly rewarded by the attainment of higher production rates and lower operating costs per unit of output.

The following paragraphs are devoted to a discussion of the more important recent developments in the refractories industry, their significance, and the resultant changes in furnace construction.

Fire-clay Brick

Fire-clay and high-alumina brick may be considered as members of a continuous series of alumina-silica refractories, in which the alumina content ranges all the way from about 25 to 90 percent, and the balance is preponderantly silica. In this series, brick manufactured from fire clays, and in which the alumina content does not exceed 47.5 percent, are known as fireclay brick. They are classified according to the service for which they are suitable, as low, moderate, intermediate and high heat duty brick, and super-duty brick. All of these find application in non-ferrous metallurgy.

Alumina-silica brick are made either by hand or by machine, from mixtures of raw and calcined refractory materials, and are fired in periodic down draft kilns or in continuous tunnel kilns. Machine-made brick are manufactured by the extrusion and the "power-press" processes. In a recent modification of these processes, denser brick are produced by the application of vacuum to the ground batch for the removal of entrapped air. The vacuum technique, as applied to the extrusion process, is termed "de-airing"; as applied to the power-press process, it is known as "Vacuum-pressing." In making vacuum power-pressed brick, the forming pressures used are approximately double those practicable without the vacuum. The brick produced are above 5 percent

heavier, and their porosity is reduced about one-fifth.

De-aired extruded fire-clay brick are giving good service in the center walls of zinc distillation furnaces, and in the linings of rotary zinc recovery furnaces. In the latter service, they have proved highly resistant to the disintegrating effect of carbon monoxide gas. Without doubt they will also find economical use in the bottom inverts of lead reverberatory furnaces, in the crucibles of lead blast furnaces, and in the flues of copper and lead furnaces.

The new vacuum pressed fireclay brick are used advantageously in bottoms, walls and roofs of open hearth nickel furnaces, in checkerwork of several types, and for other constructions in which absorption of fluxes should be reduced to a minimum.

Fire clay, the raw material used in the manufacture of fire-clay brick, consists mainly of the mineral kaolinite. A brick made from pure kaolinite theoretically would contain 45.9 percent alumina and 54.1 percent silica. Super-duty fire-clay brick approach this balance with an average alumina content of 40 to 45 percent, and an average silica content of 49 to 54 percent. Grain-sizing and a new technique in power pressing raw materials of little or no plasticity have been responsible for the development of this new refractory. Super-duty fire-clay brick, containing somewhat more alumina and less silica than brick of the high heat duty class, are also more refractory. They have greater constancy of volume and ability to support load at high temperatures, higher resistance to the fluxing action of basic slags, and much greater resistance to spalling, although their porosity is generally much lower.

The rapid expansion in the use of super-duty fire-clay brick is eloquent testimony to the economy of superior materials regardless of relative first cost. They are meeting a long-felt need in service for which high heat duty refractories have proved not entirely adequate. They are being used in the uptakes of copper wire bar and anode furnaces, center walls of zinc distillation furnaces, the linings of rotary zinc recovery furnaces, the roofs of lead softening, refining and by-product furnaces; and in the upper side walls and roofs of secondary metal, lead drossing furnaces and brass melting furnaces. Super-duty fire-clay brick of a special hard burn are giving excellent service in the bottoms of nickel anode furnaces, the roofs and upper side walls of secondary copper melting furnaces; and in the roofs of lead softening and by-product furnaces, and brass scrap furnaces.

High-Alumina Brick

High-alumina refractories include those of the alumina-silica group which contain more than 47.5 percent alumina. The classes commercially available are those containing approximately 50, 60, 70, 80 and 90 percent alumina.

The raw materials commonly used in the manufacture of high-alumina brick include diaspore clay, kyanite, sillimanite, and crystalline alumina or corundum. However, most high-alumina brick are made from diaspore clay used either alone or blended with other refractory clay depending upon the properties and alumina content desired in the finished product.

The refractoriness of brick of the alumina-silica series rises with increasing alumina content, as shown in Figure 1. However, the choice of a refractory cannot be made merely upon the basis of alumina content. With increase in alumina content, the utility of a brick of the alumina-silica series becomes more and more dependent upon the nature of the materials used in its manufacture and the way they are combined, the heat treatment employed in the preparation of calcines, the proportion of calcines in the brick batch, the kind and amount of bonding material, the process of manufacture, and the firing procedure. These factors determine the resistance of a brick to spalling and to slag absorption, its stability of volume when heated, and its ability to resist pressure at high temperatures.

High-alumina brick have been manufactured for the past 30 years or more. However, recent years have brought marked improvement in their porosity, mineral constitution, resistance to spalling, and workmanship, and a more thorough understanding of their properties and of their utility for various service conditions. Brick of the 50 percent alumina class are being used with results superior to those obtained from high heat duty fire-clay brick, in hearths of roasters operated under severe conditions. Sixty percent alumina brick find application in the upper side walls of nickel anode furnaces, bridge walls of coal fired copper reverberatory furnaces, and settings of sludge fire furnaces in which the fuel ash is corrosive. Brick of the 70 percent alumina class have proved their superiority for service in the upper side walls and roofs of lead drossing, cupel, and by-product furnaces in which the furnace atmosphere is laden with litharge.

Silica Brick

Silica brick are strong, rigid and resistant to abrasion throughout the entire range of temperatures almost to their melting point. While they are sensitive to rapid thermal changes below a dull red heat, they are notably resistant to the spalling influence of such changes above 1200° F. Their thermal conductivity is about 25 percent higher than that of fire-clay brick. This combination of properties has made them the conventional material for the construction of roofs of furnaces having wide spans, and for the construction of by-product coke ovens, gas retorts, glass tanks and other high-temperature furnaces.

The application of the power press to the manufacture of silica brick in the United States is an achievement of

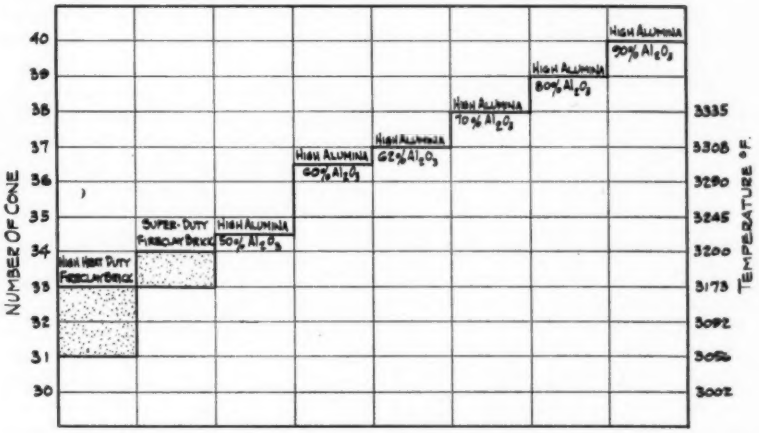

Fig. 1—Refractoriness of alumina-silica refractories expressed in pyrometric cone equivalents

recent years. The improvements resulting from this method of manufacture are the following:

1. Better workmanship, as evidenced by greater accuracy of dimensions and smoother and truer surfaces.

2. Lower porosity, which retards both the penetration of fluxes and the migration of liquid phases within the refractory.

While with power pressed silica brick there is least necessity for the use of fill or grout, some operators have found it advantageous to lay the brick with dipped joints and to grout them with a special high-silica bonding mortar. This practice greatly reduces the tendency for fluxes to penetrate into the joints, and has proved to be an important factor in effecting improved service.

Power-pressed silica brick are used in copper and nickel reverberatory furnaces, and in the roofs of copper wire bar and anode furnaces.

Setting power pressed brick on tunnel kiln car for firing

Magnesite Brick

The magnesite brick now available are of two types: (1) those bonded by firing and (2) those bonded chemically. The first have been manufactured for many years; the second are of relatively recent development. Both are highly basic chemically, and extremely refractory. The fired magnesite brick are of two classes, one containing 82 to 85 percent of magnesia, with 5 to 7 percent iron oxide, and the other 90 percent or more of magnesia with 2 to 3 percent iron oxide. These brick consist mainly of periclase crystals (crystalline MgO), often containing dark inclusions of magnesic-ferrite ($MgO.Fe_2O_3$); between the periclase grains there is a small amount of magnesium silicate crystals.

The use of fired magnesite brick in the bottoms of copper wire bar and anode furnaces, while not new, has become recognized as good practice. Brick of the low-iron, high-magnesia class are proving an economy in the linings of lead softening, drossing and by-product furnaces, the linings of copper converters, and the side walls and roofs of electric furnaces producing oxygen-free copper.

Chemically bonded magnesite brick consist of ground dead-burned magnesite usually mixed with a small percentage of ground chrome ore. The process of manufacture is similar to that for the fired brick, except for the addition of chemical binders, and the development of the bond in special humidity-controlled dryers. In service at high temperatures, chemically bonded brick undergo changes as a result of which their characteristics approach those of brick which have been fired in the usual manner.

Recent improvements in the manufacture of chemically bonded magnesite brick have resulted in increased strength, density and stability of volume at high temperatures. They are frequently used with casings of soft steel which usually cover three sides of the brick. These metal casings greatly increase the resistance of the brick to spalling.

The use of basic brick in roof service has been increasing rapidly. In some copper and nickel reverberatory furnaces, suspended arches of chemically bonded magnesite brick are being used for complete roofs; in others, they are used merely at the hot ends. In the latter case, the balance of the roof consists of sprung arch construction of either forsterite or silica brick. At several plants, the life of sprung arch roofs of copper reverberatory furnaces, in the hot section, has been increased by the use of "shoulders" of unburned magnesite brick, extending 4 to 5 feet from the skews at each side, with silica brick in the central section.

Unburned magnesite brick are being used also in the upper and lower side walls of copper reverberatory furnaces, in the upper walls of copper wire bar and anode furnaces and brass melting furnaces; for complete linings of copper holding furnaces; and to a lesser extent in copper converter linings.

Forsterite Refractories

The mineral forsterite is a silicate of magnesium having the chemical formula $2\ MgO.SiO_2$. Brick consisting mainly of this mineral were first produced commercially in the United States in 1933. These brick are manufactured from an olivine-bearing rock known as dunite. Forsterite brick are so refractory that they show only slight shrinkage at a temperature high enough to cause the melting of silica brick. The melting point of pure forsterite is 3,470° F. as compared with 3,142° F. for pure cristobalite, the form of silica which is stable above 2,678° F.

Within the past year, there has been further improvement in the quality of forsterite brick, and further extension of their use. Experience gained during the last five years in selecting dunite for the manufacture of forsterite refractories now makes possible the mining of rock of a greatly improved quality. Recent changes in the manufacturing process, including a modification of the grind and much higher firing temperature, have increased the density and stability of the brick.

Forsterite brick are finding application in the construction of the upper walls, hips and hoods of copper wire-bar and anode furnaces, and also for the front end sections of roofs of copper and nickel ore melting reverberatory furnaces. Forsterite brick in the roofs of copper anode or holding furnaces have given three years life, as compared with several months formerly obtained from silica brick in the same applications.

Chrome Brick

Chrome refractories are manufactured from chrome ore, the essential constituent of which is a solid solution of several minerals of the spinel group in various proportions. The mineral known as chromite ($FeO.Cr_2O_3$), which contains 32.1 percent ferrous oxide (FeO) and 67.9 percent chromic oxide (Cr_2O_3), is invariably a constituent of the spinel in refractory chrome ores, but probably never occurs alone. Chrome brick bonded by firing, and those bonded chemically, are both available commercially.

During the past few years there has been great improvement in the properties of chrome brick, especially their resistance to spalling and their load-carrying capacity at high temperatures. As compared with fired chrome brick, the chemically bonded brick are considerably more resistant to thermal shock. They are being used in the verb arches and upper side walls of copper wire bar and anode furnaces, and in the upper side walls of brass melting furnaces.

Insulating Materials

While insulating brick have been used in furnace construction for many years, the commercial application of insulating refractories has come about more recently.

Insulating brick have high insulating value, but their application is limited by the fact that their refractoriness and mechanical strength are relatively low. They are advantageously employed as backing for fire-clay or other refractory brick, but are not suitable generally for use in direct contact with furnace gases.

Insulating refractory brick are fired refractory products of light weight and relatively high insulating value—about three to four times that of dense fire-clay brick. While possessing several times the mechanical strength of insulating brick, they do not withstand abrasion or the corrosive action of basic dusts and fumes at furnace temperatures. However, they are used safely in direct contact with clean furnace gases, and in some cases serve for construction of entire furnace walls and roofs. They are also used as insulating backing for dense fire-clay or silica brick in service where the interface temperature is too high for ordinary insulating brick.

The economies resulting from insulation have been demonstrated satisfactorily in some non-ferrous metallurgical furnaces. The practicability of insulation for any particular case depends upon the combination of conditions which prevail. It is being used with success in copper wire-bar, anode and holding furnaces, a few of which are insulated completely. In some ore-melting copper reverberatories, where the operating conditions are not extremely severe, insulation has been applied to side walls, uptakes and roofs.

Looking Toward the Future

Further improvement in refractories is to be expected as more exact knowledge is gained regarding the inherent properties of the raw materials, the characteristics which may be imparted by processing, and the service conditions imposed. The present trend toward the use of basic refractories in roofs may be expected to continue. The possible savings from the use of insulation will be given more serious study, as will also air and water cooling. As long as developments in the refractories industry continue at their present pace there will be continual change in furnace design and construction. A static condition will be attained only when the limit of ingenuity has been reached. In the meantime, the probability of increased savings offers a strong incentive for continued investigation.

The valuable assistance given in the preparation of this paper by Messrs. W. F. Rochow, A. G. Suydam, and L. A. McGill, of the Harbison Walker Refractories Company, is gratefully acknowledged.

Extinguishing a Fire at the Argonaut Gold Mine*

● ***Organization, Cooperative Effort and Modern Methods Effective in Averting a Major Disaster in One of Deepest Mines in United States***

By S. H. ASH
District Engineer, Bureau of Mines
San Francisco Safety Station

A FIRE was discovered at 2.30 p.m., on February 15, 1938, in the underground workings of the Argonaut mine at Jackson, Calif., in the Mother Lode mining district. It is one of the deepest and most widely-known gold mines in the world and is owned by the Argonaut Mining Co., Ltd., of San Francisco.

At the time of the fire 253 men were employed, of whom 206 worked underground on all shifts combined. Just as soon as fire was discovered, the 98 workmen underground were warned by telephone, and all of them were removed promptly and safely to the surface. The mining operations are in direct charge of Alex F. Ross, superintendent, and Robert Shea, underground foreman.

The principal object in presenting the story of the fire is to show what organization, cooperative effort, and modern methods can accomplish toward averting what could easily have been a major disaster and a severe economic loss.

Shafts and Connections

The mine is worked through an inclined shaft that follows approximately the dip of the vein.

The main shaft reaches a total depth of 5,700 feet, with a raise from 5,800 up to the bottom of the shaft; a winze starts at the 5,550 level and extends to 6,150 feet (see Fig. 1). Levels are driven at approximately 150-foot intervals. Above the 4,900 level the vein dips about 57 degrees and gradually increases to 70 degrees below this point. The shaft has three compartments, each 4 by 5 feet in the clear. It is heavily timbered throughout, except for a concrete section ex-

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tending 50 feet below the collar and a 12-foot concreted section and steel fire doors at the 1,250 level. Two compartments are used for hoisting by electric hoist and steel skips. The manway compartment contains a continuous ladderway, compressed-air lines, pump columns, high-tension cable, electric-light wires and signal and telephone wires.

A second shaft, called the Muldoon, together with connecting ventilation raises, is used for ventilation and as an emergency second exit.

A large gold mine operated by the Kennedy Mining & Milling Co. (Fig. 1) is contiguous to the Argonaut mine workings on the east, and in places above the Kennedy 3,300 level they were joined. There is a small barrier pillar along the boundary line below the 5,700 level of the Argonaut mine. A raise was driven from the Kennedy 3,600 to the Argonaut 4,200 level at the time of the 1922 fire to recover the bodies of workmen; it has long since caved. By mutual agreement the two mines were connected by a refuge chamber at the 4,650 level; this has been abandoned, and a connection and refuge chamber are maintained at the 5,700 level, through which exit can be made to either mine. This fireproof refuge chamber is provided with incandescent lights, air lines, telephones, and water leading from both mines, as well as with other supplies.

View of part of surface plant at the Argonaut mine looking toward Argonaut shaft

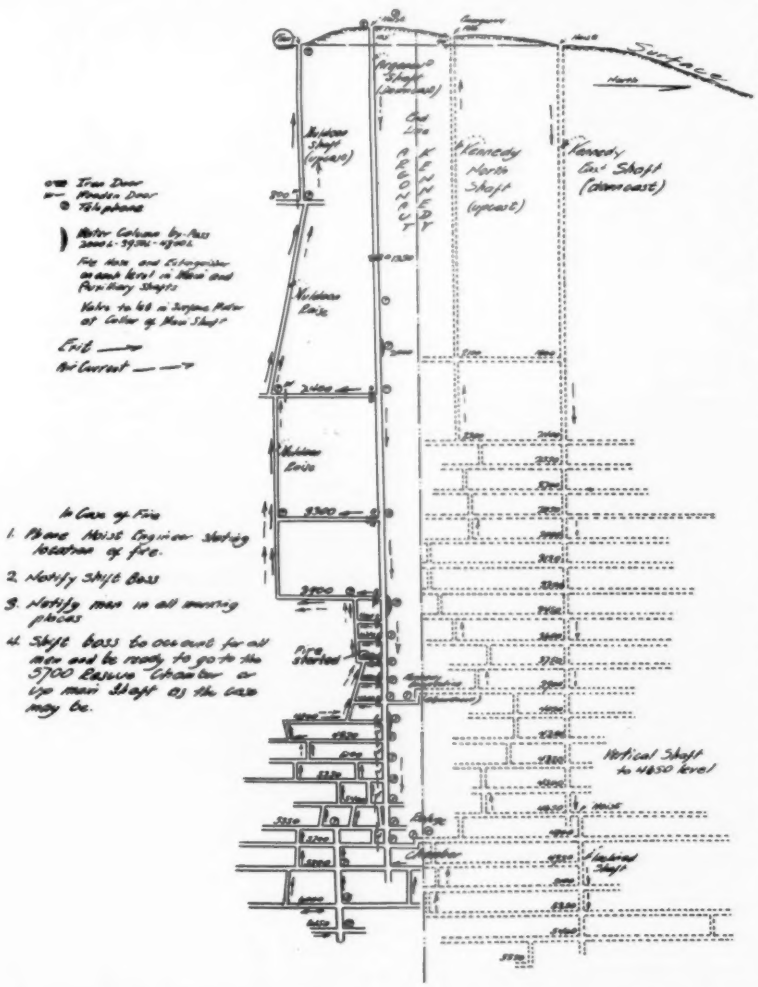


Fig. 1—Vertical section of Argonaut mine, showing ventilation and connection with workings of Kennedy mine. Fire protection plan posted on each level shown at left

The shaft stations are well lighted electrically and are equipped with telephone, signal devices, fire extinguishers, and hose and water lines. The air lines can be converted to water lines through connections at the surface. Electricity is used underground for lighting, pumping, and hoisting. Haulage is by hand tramming and storage-battery locomotives. Carbide lights are used exclusively by the underground workmen.

Mine Workings

The quartz vein carries gold-bearing sulphides, chiefly pyrite, and some free gold, and ranges in width from a few inches to over 60 feet. The walls are greenstone and slate. The greenstone is generally hard and stands well; but the slate is characteristically undependable and, coupled with steep dips, requires that the stopes be heavily timbered. An overhead stoping method is used, and the square-set timbers, which are back-filled with waste, eventually squeeze tight. The filled stopes and large amount of timber make sealing or flooding necessary to prevent a fire from spreading if it reaches the stope workings.

Mine Rescue Station

The Argonaut Mining Co. is a member of the Amador County Cooperative Mine Rescue Station, which maintains 11 sets of 2-hour Gibbs self-

contained oxygen breathing apparatus and auxiliary equipment. This station complies with the mine rescue standards [1] of the Bureau of Mines and is in charge of Clarence Krebs. Mine rescue training is conducted monthly.

Ventilation

The Argonaut is one of the best-ventilated metal mines in California. Primary ventilation is by an exhaust fan placed at the collar of the Muldoon shaft. Under natural ventilation conditions the Argonaut shaft is upcast, but it is considered practical and necessary to operate it downcast. This was an important factor in the safe exit of the workmen and the effective extinguishment of the fire.

Because of its physical connection with the Argonaut mine the ventilation of the adjacent Kennedy mine is important (details shown in Fig 1.). It is ventilated naturally, the main shaft being downcast, and the north shaft upcast. For emergency purposes a reversible centrifugal fan is housed in a fireproof building on the surface at the north shaft collar. Under emergency conditions either mine can be ventilated by opening the iron doors of the refuge chamber at the connection between the Argonaut 5,700 and the Kennedy 4,800 level. Under normal conditions ventilation is from the Kennedy toward the Argonaut, even when the Muldoon fan is stopped. The two mines are now so arranged and equipped as to furnish important aid to each other in emergencies such as mine fires.

Intake air for the Argonaut goes directly to the 6,000 level and returns through the live workings and ventilation raises to the Muldoon fan. Doors and bulkheads placed on the various levels provide this "continuous" ventilation system.

Account of the Fire

Except for repair work in the ventilation raises and special jobs, no work was being done above the 5,400 level the day of the fire. The 3-man repair crew were repairing the 4,800- to 4,350-level ventilation raise in the vicinity of the air timber-hoist on the 4,350 level (Fig. 2). The regular crew of 98 men were employed in the bottom levels.

The 3 repair crew men were hoisted from the 4,350 level at noon, and at

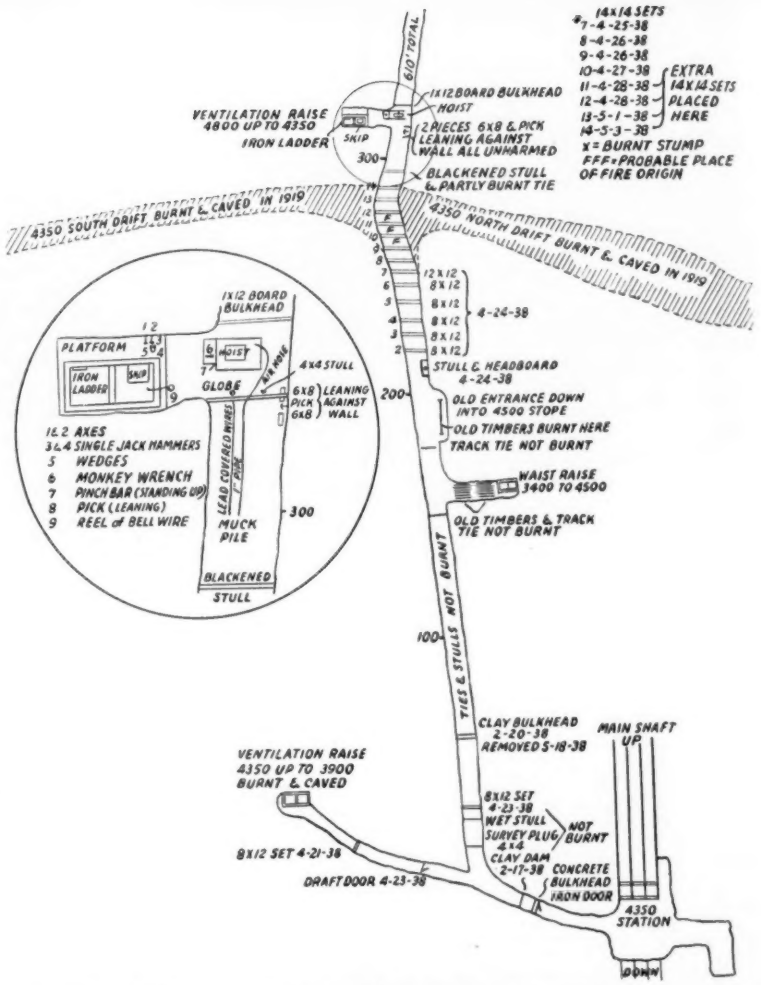


Fig. 2—Plan sketch of part of return ventilation system on the 4350 level enlarged from mine map—reopened after fire

2.30 p. m. smoke was discovered emerging from the Muldoon fan. The first men hoisted a few minutes later reported that they had smelled smoke at the 4,350 station of the main shaft. William Sinclair, superintendent of the adjacent Kennedy mine, was immediately notified and within 15 minutes Clarence Krebs, mine rescue station foreman, was at the Argonaut with the mine rescue apparatus.

Because of the vital connections with the Kennedy mine, Edw. C. Hutchinson, president, and William Sinclair, superintendent, also took steps for protecting their workmen and property.

Attempts to Control and Extinguish the Fire

Experience with previous fires at this mine proved that unless fireproof doors or bulkheads are placed between the main shaft and ventilation raises, a fire in or near one passageway probably will reach the other if it cannot be extinguished immediately. Unless a fire can be sealed effectively before it reaches the abandoned workings, it will probably spread to contiguous workings and connecting properties. Following the 1922 fire it was decided to place iron doors in concrete frames at all levels connecting the main shaft and ventilation raises in the Argonaut mine above the 4,800 level; to concrete the main shaft for 12 feet; and to place at the 1,250 level steel fire doors that could be closed if the mine had to be sealed. These precautionary measures made it possible to seal the recent fire effectively; facilitated the quick removal of the workmen; and probably saved the mine, because the fire had reached the iron fire door on the 4,350 level before it was discov-

[1] Bureau of Mines, Mine Rescue Standards: Tech. Paper 334, 1923, 44 pp.

ered. This door is about 35 feet from the main shaft and unquestionably prevented the fire from reaching the shaft.

A mine fire can be extinguished by one or a combination of several methods—directly, by sealing, by flooding, or by filling—depending upon its location, intensity and the ventilation control features in effect.

When the fire was discovered inby the fire door on the 4,350 level it was apparent that if it was confined to an area near the door it might burn itself out rapidly and could be fought directly by hose and water after the air intake to the fire was checked, because the mined area adjacent to and above this location was the site of previous fires (Fig. 2). If this could not be done there remained the next method, that of sealing; and in event this failed, flooding (which was apt to be ruinous) was about the only course left. It was believed that the fireproof doors in levels to the 4,800 level and in the shaft at the 1,250 horizon would prevent the fire from reaching the main shaft if it did not get below the 4,800 level and afford a quick and ready means of sealing the mine.

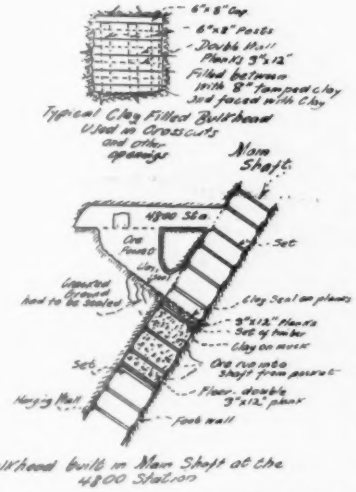
As soon as the fire was located definitely in the 4,350 crosscut, crews were organized and proceeded in fresh air to stop the fans at the 4,800 and 6,000 levels by pulling the main line switch at the 4,800 pump station and to build a bulkhead at the 4,650 level in the long ventilation raise connecting the 4,800 and 4,350 levels. This restricted the air flow to the fire but on account of leaks also kept the air flow toward the Muldoon fan and away from the Argonaut shaft and Kennedy mine, from which all but maintenance men had been removed. All power was cut off below the 4,350 level except the main shaft lighting; and pump men remained to operate pumps at the 2,000 and 3,950 pump stations.

On the day after the fire, apparatus crews explored the region at and above the 4,350 level, and fresh-air bases were established. Caving had occurred in the 4,350 crosscut, where it passed through the vein channel that was burned in the 1919-1920 fire. The timbering in the ventilation raises between the 4,350 and 3,900 levels was burned out completely. Dams were built in the 3,900 and 4,350 levels to divert water into the old mine workings below the 4,350 level. This cooled the 4,350 crosscut so mucking could be started at the caves. This was done by crews wearing oxygen apparatus.

Hoist and tools at top of ventilation raise from 4800 to 4350 levels

Inspections for noxious gases were made continuously by engineers of the state and by the Federal Bureau of Mines.

On Friday, February 18, three days after the fire started, burning embers were exposed during mucking and gases drove the men out of the 4,350 crosscut. It was apparent that pressure was developing in the area beyond the caves, and the fire undoubtedly was making its way downward in unknown directions. The following morning gas and temperatures were more troublesome, and the fire was found to have worked down old raises to the 4,650 level. Sealing operations went forward; all the steel doors above the 4,800 level were sealed with clay; bulkheads (Fig. 3) were built in certain auxiliary connections above the 4,800 level and one in the main shaft



Bulkhead built in Main Shaft at the 4800 Station

Fig. 3—Typical bulkhead built for sealing fire area

below the 4,800 level; a dam (Fig. 4) was constructed on the 4,800 level; and the fire doors at the 1,250 level and the main fan were closed and sealed. This work was done in large part by mine rescue crews. The work

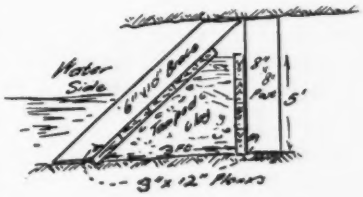


Fig. 4—Typical dams built by rescue crews to divert water on 4800 and other levels

was completed and the fan shut down at 2 p. m., February 26, 11 days after the fire was discovered.

Protective Devices Used

The shift leaders were equipped with candles, safety lamps were used on all shifts by the state officials and Bureau of Mines personnel to protect against oxygen deficiency, and men working in fresh air were provided also with all-service gas masks. The Bureau of Mines complete equipment of 11 sets of Gibbs oxygen breathing-apparatus and gas masks was on hand at the mine rescue station established at the Argonaut shaft to be used in conjunction with the cooperative station equipment. All wearers of mine rescue apparatus were examined for physical fitness. The hoolamite CO detector was used by the state and Bureau personnel, and canaries were placed at all fresh-air bases and pump rooms to indicate the presence of car-

bon monoxide. Pumpmen were necessary in the Argonaut mine until dams were completed. Owing to the long exposure required of pumpmen and others, it was felt that these devices did not render enough protection because their lower limit of carbon monoxide detection was high (0.07 to 0.10 percent), and an M. S. A. supersensitive carbon monoxide indicator, reading from 5 to 1,000 parts per million, was used. This device proved invaluable for making tests for carbon monoxide at stoppings, in pump rooms, and in the adjacent Kennedy mine. It played a most important part in proving that no leaks of carbon monoxide existed at any time between the Argonaut and Kennedy workings.

Plans for Unsealing

The managements involved realized that the failure to extinguish previous mine fires by sealing was due to incomplete sealing; to reopening the fire areas too soon; in large part to the absence of emergency fireproof doors; and to lack of facilities and agencies for checking conditions with proper equipment. A request was made to the Bureau of Mines for assistance, and the managements decided that the mines would remain closed until the fire areas cooled and that additional bulkheading would be done if necestary to reduce the carbon monoxide content to zero. Experience and findings of the Bureau of Mines indicate that the fire is likely to be extinguished [2] at this stage. A plan for systematic sampling and analysis of gases and interpretation of the results was formulated by the Bureau of Mines engineers.

Gas Sampling and Analyses

A program of rescue, sealing, or recovery at a mine fire requires accurate knowledge of the constituents of the mine air since toxic gases are invariably present.

After sealing operations were completed the problem was to determine whether combustion could occur and when the carbon monoxide had disappeared. The fire was almost a mile underground vertically, and it was planned to test the air at such available points as the Muldoon fan duct on the surface; the Argonaut shaft, above and at the fire doors in the main shaft at the 1,250 horizon; the refuge chamber below the fire in the Argonaut 5,700-level connection with the Kennedy 4,800 level; and the Kennedy north shaft, at the 3,300, 3,900, and 4,800 levels at the boundary-line connections.

Until sealing operations were completed, tests were made with the flame safety lamp for oxygen deficiency and presence of methane; with the M. S. A. methane detector for methane; with candles for oxygen deficiency; and with the hoolamite CO detector, canaries, and M. S. A. hopcalite carbon monoxide indicator for carbon monoxide.

Methods of Sampling and Analysis

Samples of mine air were taken by the vacuum-tube method and analyzed by Bureau of Mines chemists at the Pittsburgh gas laboratory, Pittsburgh, Pa., and Northwest Experiment Station, Seattle, Wash. Analyses were made for CO_2, O_2, and CH_4 with the Haldane and Orsat apparatus and for CO by the pyrotannic acid method following the standard Bureau of Mines procedure.[3] Inasmuch as 0.01 percent is the lower limit of accuracy for the pyrotannic acid method and immediate results were desired, additional carbon monoxide determinations were made by the M. S. A. supersensitive carbon monoxide indicator, which readily indicates 0.0005 to 0.10 percent carbon monoxide. So far as the author knows, this was the first time that this indicator had been used to any extent in connection with a metal-mine fire. The extreme accuracy of the instrument and the simplicity, rapidity, ease, and cheapness with which determinations are made, suggest that it is valuable for use at mine fires and in regular ventilation studies in metal mines.

Looking toward station from 4350 hoist. The first cross timber is a blackened unburnt steel that now has a prop under it

Regular gas sampling was begun at the Muldoon fan at noon on February 23, with the fan running and drawing air from the main shaft at points being sealed.

A water gage and sampling aperture were placed at the Muldoon fan on February 26, when it was stopped and sealed.

The mine air was sampled systematically at various points under seal. Lack of space prevents a detailed description of this work, but by March 17 events indicated that the changes of pressure at the Muldoon fan were affecting the samples; sampling of gases nearer the fire zone and steps to stop probable leaks at the Kennedy 3,300 level crosscut and in the Argonaut shaft above the 1,250 fire doors were deemed advisable.

Looking toward hoist through area burnt in the 1919 and 1938 fires. Supt. Ross has a foot on last burnt stump, with others visible on both sides in foreground

[2] Forbes, J. J., and Grove, G. W., Procedure in Sealing and Unsealing Mine Fires and in Recovery Operations Following Mine Explosions: Miners' Circ. 36, Bureau of Mines, 1938, pp. 49-51.

[3] Berger, L. B., and Schrenk, H. H., Methods for the Detection and Determination of Carbon Monoxide: Tech. Paper 582, Bureau of Mines, 1938, 30 pp.

A tight door was placed outby the steel door separating the Kennedy 4,800 level from the Argonaut at the refuge chamber, space being allowed between the doors for 10 apparatus men. High rock temperatures and humidity at the Kennedy 4,800 level made it necessary to provide fresh air, in motion, at the air-lock in order to sample the gases. A 6-inch Lamb air-foil injector, blowing 2,000 cubic feet of air per minute, was placed in the last raise connecting the Kennedy 4,800 and 4,950 levels, and metal tubing was extended to a point outby the air-lock, which was established as a fresh-air base for a reserve crew of five apparatus men.

On March 29 two crews of five men each were selected from the Argonaut and Kennedy personnel. Previous tests established that no dangerous methane was present, and an apparatus crew of six men, including the captain, entered the air-lock under oxygen, broke the seals to the Argonaut mine, and entered and explored the refuge chamber and the Argonaut section. Samples of the mine air and humidity readings were taken, and the carbon monoxide indicator was operated for 20 minutes. Temperatures at the fresh-air base were 88° wet, 91° dry; in the Argonaut mine, 92° wet, 92° dry. The pressure on the seal was negative, and a safety lamp placed in the air lock remained lighted. When the first crew returned the second crew of six men, including the captain, entered the air lock under oxygen and replaced the mine seals.

Cooling of the fire zone proceeded rapidly during the week of April 1. The pressure at the Kennedy 4,800 seal was observed to be changing from negative to positive for the first time. Black damp extinguished the flame of a safety lamp at the sampling pipe, indicating that the high specific gravity gases in and above the fire zone were readjusting themselves, and their density was increasing enough to move them to displace the lighter specific gravity gases in the Argonaut mine below the fire zone. This readjustment of heavy atmosphere materially changed the pressure from negative to positive on the Kennedy mine seals and was the first definite indication that the fire was extinguished.

On April 8, as on March 29, crews wearing oxygen breathing apparatus entered the Argonaut mine through the Kennedy 4,800-Argonaut 5,700 refuge chamber connection, and tested the atmosphere.

The pressure on the Kennedy seal now was constantly positive, and the flame of a safety lamp placed in the air lock was extinguished immediately due to gases entering through the refuge chamber door, left slightly ajar to allow passage of the life-line. Temperatures at the Kennedy side fresh-air base were 88° wet, 89° dry, and in the Argonaut mine, 91° wet, 92° dry. Before the crew completed its tests and returned, the air from the Argonaut flowed through unavoidable leaks and decreased the oxygen supply at the fresh-air base so much that the flame of a safety lamp was extinguished and a carbide light failed to burn at a point waist high, which showed the value of taking fresh air to this point by the Lamb air-foil injector and metal tubing. This noxious air condition cleared as soon as seals were closed. The carbon monoxide indicator showed no carbon monoxide during the tests.

On April 15 the author, Mr. Johnson (state mine inspector), Superintendent Ross and Foreman Shea concurred in the belief that the fire was out. Arrangements were made to reopen the mine on April 15, just two months after the fire was discovered.

Method of Rehabilitation

To minimize pressure on the fire area and shaft seals above and on the 4,800 shaft bulkhead, the fan was not started until mine rescue crews under oxygen and using the skip, successfully made trips and removed the shaft bulkheads at the 800 and 1,250 stations and the fire doors and bulkhead in the 2,400 level crosscut.

Old timbers piled in short drift that connected with 3900 to 4500 waste raise. They did not catch fire although nearest are but six feet from center of crosscut

Thorough sampling showed that the CO was gone, that CH_4 existed in negligible amounts, and that the important factor in reopening the mine was to protect against oxygen deficiency.

The fan was started April 16 and the fresh-air base established at the 2,400 station. The procedure of adding ventilation a little at a time was repeated until the mine ventilation was restored, workings below 6,000 level were dewatered, and the mine was rehabilitated to the point of resuming milling operations on July 16.

The 4,800 level was reached on May 4, and it was found that the fire had reached its lowest point in the 4,800

(*Continued on page 53*)

Near 4350 station with Supt. Ross in main crosscut with hand on 4 x 4 unburnt stull. Shows sharp angle draft makes, yet no embers found, and track ties were unburnt

Coordination of State and Federal Aid to Mining*

● ***Any Extension Should Be Such as to Preserve Independence of the Industry From Governmental Coercion***

MINING has always been considered an individual enterprise, and rightfully so because the preeminence of mining in the world's commerce and industry is largely the result of individual effort and initiative. What industry can boast of such individual accomplishment as mining? Of the trio who have made mining what it is today, the prospector is synonymous with the pioneer, the most rugged and independent of individuals. Likewise the engineer, who follows in the steps of the prospector or precedes him, and yields to no one in his knowledge of the far and difficult places of the earth and his mastery of stubborn nature. And by the very nature of mining, the capitalist who supplies the funds to develop this all-important industry must have foresight and intestinal fortitude not common among his colleagues in other industries. Nevertheless it *is* true that since the discovery of gold in California, down to the present time, miners have been assisted and aided by the coordination of state and federal governments.

The coordination of State and Federal Governments was first shown in the adoption by both governments of the early-day rules, regulations and customs of the miners, especially those governing the location and retention of mining claims. This recognition given the miners has been called the "American Common Law of Mining."

Although the State of California originally laid claim to the gold and silver of the public domain within the state, the California Supreme Court in 1861 abandoned the doctrine, and opened the way for uncontested federal legislation. We now have, in addition to federal legislation, supplemental state statutes aiding the miner in establishing his rights and perfecting his claim.

State Statutes Aid Miner

Let us consider a specific instance. As early as February 4, 1865, the state legislature of Nevada granted to A. Sutro a franchise, giving him the exclusive right-of-way for 50 years for the construction of a tunnel to drain the great Comstock Lode, commencing in the foot-hills near Carson City, and extending to and beyond the Comstock Lode. The followng July a Congressional Act was passed giving a perpetual right-of-way to Sutro and his associates for the driving of the tunnel, and granting certain other rights and privileges. In August, 1866, the Nevada Legislature passed a memorial and resolutions asking the United States Congress to loan its credit to this important work in case sufficient capital could not be secured from private sources, and in a lengthy report set forth reasons "why the nations should feel a deep interest in its execution." Congress *did* consider the matter, and the Committee on Mines and Mining wrote in its report the following:

"Fully appreciating the impetus which would be given to the development of our great mineral resources by the construction of this tunnel, after a most thorough investigation we recommend a loan of $5,000,000 in 20-year 7 percent bonds, to be delivered at the rate of $15,000 for every 100 feet of tunnel completed."

The report further stated:

"Your committee considers the execution of one great mining work, such as the proposed tunnel to the Comstock Lode as conducive to the most beneficial results; it would practically demonstrate the continuance of mineral lodes in depth, thereby establishing confidence in the execution of similar works in *all* mining districts."

By ROBERT S. PALMER

Secretary, Colorado Chapter
American Mining Congress

A heated debate took place in the halls of Congress on the subject, and we find in the record such statements as these:

"The development of the mineral resources of this country forms a subject of such grave importance, one involving consideration of a politico-economic nature of such significant consequences, that it well behooves the American statesman, the patriot who has the future of this great republic at heart, to devote some time to the earnest examination of those questions which have a vital bearing upon the future welfare of this country.

"That it is both the duty and the interest of the government to aid in the construction of one such tunnel to serve as an index-work, and thereby establish the continuance of mineral lodes in depth, cannot admit of any doubt.

"Wisdom and foresight point out but one course: let the mineral resources of the country go to ruin, and the national debt, the burdens of taxation, and general suffering will be increased from year to year."

Keep in mind these statements were made in the sixties, and deserve comparison with the expressed attitude of

* Presented to Metal Mining Convention of the American Mining Congress, Western Division, Los Angeles, Calif., Oct. 24, 1938.

certain governmental officials of the present administration in a recent case.

Colorado's Recent Experience

The State of Colorado, when it found the federal government intended to launch a huge spending program, attempted to set up a state agency which would cooperate with the federal government in aiding the mining industry. This agency was designated the "Colorado Mineral Industry Planning Board." It was composed of highly respected men representing the various recognized technical, professional and mining organizations, as well as the president of the School of Mines and various state officials.

In answer to a query addressed to the Secretary of the Interior as to whether mining projects were included under the terms of the National Industry Recovery Act, the reply was that "mining was nowhere mentioned"; "that the Act would authorize loans for the conservation and development of natural resources, but that unless some element of conservation were present, a project would not be eligible." The Board attempted to show the Secretary that mining was included under the terms of the Act, and that the production of metals was actually a conservation of these metals, and certainly a development of natural resources. Many Western Congressmen expressed this view, and stated that just such projects as the Board had in mind were intended to be included in the Act.

The first projects submitted were those of the driving of two deep drainage tunnels, designed to unwater the deep mines of the Leadville and Cripple Creek districts. These projects were both turned down by the Public Works Administration, and Secretary Ickes informed the Board that it was not reasonable for the Act of Congress to be amended to include mining, for mining was essentially "private in character" whereas the Act was intended to assist enterprises essentially public in character "that stimulate capital goods industries." The members of the Board felt that financial aid for these two projects would do more to stimulate capital goods industries than many of the projects which were being approved by the Public Works Administration, and that although many of them preferred to consider mining as a strictly private business, state statutes and court decisions held otherwise.

Under one statute we find:

"The industry of metalliferous mining in the State of Colorado . . . is hereby declared to be affected with the public interest, and the conservation and development of the natural metalliferous mining resources of the state will aid and promote the accomplishment of the objects and purposes of such national legislation and also the welfare of the people of the state . . . and for such purposes it is part of the public policy of the state to attract and encourage investment of domestic and foreign capital and resources for the resuscitation, revival and maintenance of such mining industry," and where this is not possible "to secure and obtain financial assistance from the United States of America."

In the famous Dayton Mining Company case Chief Justice Holly of Nevada said:

"Mining is the greatest of the industrial pursuits of this state; all other interests are subservient to it. . . . The mining and milling interests give employment to many men, and the benefits derived from this business are distributed as much, and sometimes more, among the laboring classes than with the owners of the mines and the mills. . . . Nature has denied to this state many of the advantages which the other states possess, but by way of compensation to her citizens has placed at their doors extensive ore deposits." (11 Nev., 394.)

Other statutes and decisions might be cited, but the principle is so well established that mining is vested with the public interest and "is a public use" that no further reference need be made here. (198 U. S., 361, 25 Sup. Ct., 676, 4 Ann. Case 1171, 49 L. Ed. 1085, 83 F 45; 78 P 296; 88 P 773; 8 L. R. A. (N. S.) 567).

The State of Colorado has recently enacted a new law, setting up a duly constituted state agency, known as the "Mineral Resources Board" for the primary purpose of cooperating with the federal administration in the construction of drainage tunnels, mills and mill tailings disposal projects. The Act creating this Board was modeled after a similar Act in Montana which was held constitutional, but which had as its subject matter aid to the farming industry rather than aid to the mining industry. The Leadville drainage tunnel project was again submitted to the Federal Emergency Administration of Public Works by this new state agency. What action will be taken is not known, but Secretary Ickes is quoted in the press as stating that "We are not interested in benefiting any particular industry—whether it be mining or fishing." This statement of the Secretary either illustrates that he never intended to assist in any way the basic industry of the West, or that he had not seen the new application when he made the statement. At any rate the Cripple Creek district decided not to re-submit its project, and may drive its tunnel itself. It will be interesting to see which tunnel is driven first, and may act as Exhibit A of the efficiency of private initiative in comparison with governmental red tape. Is it any wonder in view of this and other public pronouncements that there is a general feeling in numerous mining districts of the West that Uncle Sam has put mining in the orphan class?

Various illustrations of the *successful* coordination of state and federal governments in aid of the mining industry, however, can be cited.

Hydraulicking Resumed in California

You in California have had an interesting experience in making possible the resumption of hydraulic mining without injury to farmers and other land owners. After a decision was rendered by the United States Circuit Court, amounting to an injunction preventing mining where debris was discharged in the streams tributary to the Sacramento or San Joaquin Rivers, a small group of your citizens got together and decided to work out a solution of the problem. In 1893 Congress passed a bill known as the "Caminetti Act" which, among other things, provided for the appointment of three officials of the Engineering Corps of the United States Army to comprise a California Debris Commission. Recently an amendment to the Caminetti Act was passed which called for the construction of debris dams by the government, but arranged for the liquidating of the costs by a levy per cubic yard in place of all gravels worked. Impounding units are now said to be in the course of construction and should be completed within the next few years. It has been estimated that the completion of these dams will result in the production of six hundred million dollars of gold, and an era of comparative prosperity and security in the district affected is anticipated.

Bureau of Mines Cooperative Work

The work of the United States Bureau of Mines, in cooperation with the various states, is an excellent illustration, and is so well known and conceded to be so praiseworthy that mere reference is made to it in this paper.

The cooperative geological and topographical survey being conducted in Colorado is a splendid example of what can be accomplished through coordination of state and federal governments for the aid of the mining industry.

Underwritten by the Colorado Mining Association and the Colorado Metal Mining Fund, and supported by the State Legislature and voluntary contributions by mining companies, the

(*Continued on page* 47)

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

WHILE the drive for adjournment has continued during the past month, with pressure continuing from administration leaders on Committee chairmen to push the "needed" bills out for action, the objective date of June 15 for winding up the first session of the 76th Congress seems now to be fading, at least into the month of July. There are now three issues on the legislative horizon which bear possibilities of trouble and prolonged debate. At the end of April the President sent to the Capitol the first of his series of reorganization orders, transferring and consolidating federal bureaus and agencies. Such orders become effective in 60 days unless disapproved within that time by the Congress. Another Presidential message urged continuance of the present methods of administering relief and asked $1,762,490,000 for the WPA and other agencies for the fiscal year 1940. Added to the potential delay in adjournment involved in these two messages is the feeling on the part of a considerable number of Senators that there exists at present a real danger that administration activities in international affairs may involve the United States in war. These views have been frankly stated in spirited debate on the Senate floor, and the extent to which this feeling spreads may have a very definite effect—not only on the time of adjournment, but on the pending bills for amendment of the National Labor Relations Act, the Wage-Hour Act, the Social Security Act, the Guffey Coal Act, and also on the treatment accorded to the desire of the Treasury for a general overhauling of the revenue laws.

Taxation

Recent weeks have witnessed additional expressions from many sources of the need for a sufficient revision of the revenue laws to encourage business enterprise and to stimulate the flow ot investment capital into industrial activity to provide employment and improve national conditions. This movement has been encouraged by the report of the Brookings Institution and by the knowledge that the Treasury stands prepared to furnish to the Committee on Ways and Means and on Finance specific recommendations on changes in the law. The White House has remained silent and no further encouragement has come from the new Secretary of Commerce since his Des Moines speech. Apparently the matter is to be left for the Congress to decide.

Very recently in the Senate, debate on adjournment was precipitated by the introduction of Senator Bankhead's resolution to adjourn the Congress by June 15. In this connection the words of Senator Barkley of Kentucky, the majority leader, are significant:

"The question of whether we shall embark upon a general revision of taxes has been under discussion here since we came to Washington in January. I agree that if we go into a general revision of taxes we shall be here all summer, because it is impossible in a short time to revise a complicated tax system, whether we simply undertake to remove money from one pocket and put it into another or whether we undertake to abolish taxes that raise the amount of revenue estimated by the Treasury and replace them with taxes on something else which is untaxed or which is not taxed as much as it would be under a new law.

"The House of Representatives, as I have understood from the leadership of that body and others dealing with taxation, have planned to send to the Senate probably three simple resolutions, one extending the so-called nuisance taxes which expire this year; another one extending the shadow of the undistributed profits tax on corporations, which raises about $56,000,000 a year; and another one postponing the set-up of the Social Security tax."

On the day following Senator Barkley's remarks, Chairman Robert Doughton of the House Committee on Ways and Means, in answer to questioning by newspaper men, stated that he knew nothing of any plan to introduce resolutions such as Senator Barkley had described. On May 3 Representative McCormack of Massachusetts, a potent member of the Ways and Means Committee, stated in a radio address his suggestion that all taxpayers —business groups, large and small; individuals; labor, and agriculture unite on a reasonable program of tax revision, to include:

1. Drastic modification of the capital gains and losses tax.
2. Drastic reduction of income surtaxes, preferably to a maximum of 25 percent.
3. Complete repeal of the undistributed profits tax.
4. Substitution of a single income tax for the present corporate income tax, capital stock tax, and excess profits tax.
5. Granting the right to corporations to carry over their net losses for at least two years.
6. Elimination of the tax on intercorporate dividends.
7. Elimination of the individual normal income tax on corporate dividends.
8. Permission for affiliated corporations to file consolidated returns.

The above expressions from both sides of the Capitol indicate the uncertainty which now surrounds the legislative situation on the question of revenue law extension or revision.

Monetary

On April 21 the Somers bill, extending the power of the President to maintain the $2,000,000,000 stabilization

fund and to fix the weight of the dollar, passed the House. A motion to recommit the bill was voted down 225 to 158. The bill carries authority to continue the purchase of domestic silver at a price set by Presidential proclamation. Over in the Senate the companion measure by Senator Wagner is still subject to hearings, and it is understood that Senator Carter Glass of Virginia intends to continue his resistance to the granting of power to the President to further devalue the dollar. A measure by Senator Thomas of Oklahoma, providing for the exchange of domestic goods for foreign silver is expected to come out of the Senate Committee on Agriculture and Forestry. There has been no action in the Committee on Banking and Currency on Senator King's bill which would legalize the holding of gold coin and gold certificates by the people, and would authorize the Treasury to pay for gold in such coin and certificates.

National Labor Relations Act

On April 11 Senator Wagner, author of the National Labor Relations Act, made the opening presentation at hearings on the Burke, Walsh, Holman and Ellender bills which carry amendments to make the law more workable and to confine the activities of the National Labor Relations Board to more proper and definite channels. The hearings were then recessed for a week. Senator Burke appeared for his amendments on April 17 and was followed by Senator Holman of Oregon and Representative Hoffman of Michigan. Senator Walsh of Massachusetts, sponsor of the A. F. of L. amendments, withdrew his appearance, it is rumored because of CIO pressure from his home State, but the Senator has been present at the hearings as a member of the Committee on Education and Labor. Chairman Madden and General Counsel Fahy of the Board have held forth at length before the Committee and AFL President William Green and General Counsel Padway have also appeared. A most interesting point was brought out when General Counsel Fahy, in response to questioning testified that the National Labor Relations Board discouraged the local settlement of labor grievances between an employe and his employer. He stated that such matters should be referred to the National Labor Relations Board because it was felt that the workman was not in position to make the best settlement of his complaint when dealing only with his employer. Fahy's testimony on this point was brought into the limelight by Senator Burke in a public address made in Washington on May 3.

The slow progress of the hearing has caused delay in the appearance of industrial witnesses and it is now thought that the mining witnesses from a number of States will not begin their appearances until the week of May 22.

Wage-Hour

The amendments to the Fair Labor Standards Act sponsored by House Labor Committee Chairman Mary Norton of New Jersey were reported late in April and are subject to House action under a closed rule on May 15. Covering wider exemptions for agricultural labor, the amendments would also make Administrator Andrews' regulations valid in a manner similar to the regulations issued by other Federal Departments and Agencies, and would give the Administrator authority to approve "constant wage" plans for the averaging of hours worked over a period of several weeks. This feature should be liberalized to meet the original intention of the 6-months averaging of hours provision so much needed by the mining industry. Also, under the amendment, all employes receiving $200 or more on a guaranteed monthly basis would be exempt from the maximum hour provisions of the Act. There is a strong feeling on the part of many Southern and Western Senators that the provisions of the Fair Labor Standards Act should be changed and made workable for industrial activities outside and beyond the so-called "sweat shop" class, and while the Senate Committee on Education and Labor may hold closely for the original form of the Act there is some possibility for improvement on the Senate floor.

Strategic Minerals

April 26 saw the passage of the Faddis bill in the House providing $25,-

(*Continued on page 53*)

Main Entrance, New Annex, Library of Congress

—Horydczak

Coal men at the session on Mechanical Loading

CINCINNATI—COAL'S CAPITAL

● *Industry's Meeting During Week of April 24 Declared Huge Success*

ADVANCE predictions of another outstanding success of the 16th Annual Coal Convention and Exposition of the American Mining Congress were borne out during the week of April 24-28 at Cincinnati, Ohio. Meeting under conditions in many ways more adverse and unpredictable than at any time during the 16 years' history of this event, with the entire Appalachian area in the throes of a complete shutdown pending settlement of the wage controversy, and with other fields operating at capacity in anticipation of an early shutdown, total attendance reached a figure of 3,745. Excluding some 200 men from a single mine who have attended previous meetings but were not present this year, the attendance was within ten percent of the 1938 figure of 4,157. A total of 1,903 operators, 1,665 manufacturers and 177 ladies swarmed into Cincinnati from all points in the United States. This was indeed the acid test, and speaks louder than mere words can say of the real value attached to this annual event by the coal mining industry. From every quarter have come reports from both operators and manufacturers alike which attest the splendid success of the 1939 meeting.

W. J. JENKINS

National Chairman, Program Committee. Mr. Jenkins also acted as chairman of the session on National Economic Problems

Outstanding contributions toward this achievement were made by William J. Jenkins, president of the Consolidated Coal Company, national chairman of the Program Committee, and 102 committee members working under his direction. Likewise, 100 members of the various arrangements committees, working under the guidance of P. C. Thomas, vice president, Koppers Coal Company, as general chairman, were in no small part responsible for the clock-like manner in which all events at the meeting were staged. To all these men the coal industry owes a vote of thanks and commendation.

Official opening of the Convention and Exposition was Monday morning, April 24, and activities continued without letup until 1 p. m., Friday, April 28, when the final curtain was rung down, and the many hundreds of tired but thoroughly satisfied operators and exhibitors who remained to the end, packed up and started their homeward trip.

Forward Strides in Mining and Preparation and Outstanding Economic Problems Reviewed by Speakers

The convention sessions were formally opened Monday morning at 10 o'clock by Julian D. Conover, secretary of the American Mining Congress. After extending a cordial welcome, Mr. Conover stressed the importance of this annual event, stating:

"For 16 years these meetings have served as the inspirational center for the coal industry's efforts to develop better mining methods and new and improved equipment, thereby making possible large scale production of a better product at a lower cost, and enabling the industry to hold its own in the face of the intense competition of other forms of energy. In each of these years we have seen new things on the exposition floor and have heard many new developments in mining methods described in the convention hall. Each meeting has been a milestone in a steady march of progress; and it is only necessary to look back and compare the exhibits and operating discussions of 15 years ago with those which are being presented to us this week, to realize the tremendous forward strides which our industry has made.

"This progress has been made possible through two primary factors. First, the vision of the many forward-looking coal operators who appreciate the importance of working together and contributing the results of their own experience for the benefit of the whole industry; and second, the cooperation—which we might call the enlightened self-interest—of the manufacturers, who realize that their welfare is in large part tied up with that of the coal industry, and that if they can develop more efficient tools for coal production, both they and the industry will benefit accordingly. The spirit behind the whole drive for modernization of the industry has been one of close coordination and helpfulness among coal operators and manufacturers, and it is this same spirit which is the keynote of our meeting here today."

Program Committee Chairman W. J. Jenkins, in commenting on the work of planning the program, expressed his appreciation for the assistance that had been given by operators and manufacturers and said:

"It is indeed gratifying to see this convention opening with such a representative group of coal operators and manufacturers present, particularly since at this time a large part of our industry is engaged in negotiating a wage agreement. This is naturally keeping away some of our friends who have been in constant attendance here for many years, and it is quite a disappointment to them and to us that they cannot be here today.

"Most of you have been hearing from the Program Committee, asking your assistance in the selection and preparation of the papers and discussions. I want to express my personal appreciation to the Program Committee as a whole—both state and national—for the 100 percent cooperation they have given in building up what I believe will prove one of the most constructive programs that the American Mining Congress has ever held. We are sure that the papers which they have secured will be informative and helpful in the conduct of your business when you go back home.

"A major feature of this convention, as has been pointed out by Mr. Conover, is the splendid exposition of mining machinery and supplies under the auspices of the Manufacturers' Division of the American Mining Congress. This group of manufacturers are in my judgment the mechanical research division of the coal industry, utilizing the best talent of mining and mechanical engineers to develop efficient equipment for our use. I admire the courage and confidence which they have displayed in bringing all these machines and equipment to Cincinnati, and I wish to urge that every coal operator present take advantage of this opportunity and see everything that is shown in the booths in the exposition halls.

"The large exhibits are spectacular and interesting, but you will also find in the smaller exhibits, things that will be helpful in increasing the efficiency of your operations and reducing your production costs."

R. L. Ireland, Jr., president of the Hanna Coal Company and chairman of the Coal Division, was held in New York by the wage negotiations, but telegraphed his greetings and good wishes to the convention and to the coal industry which "in spite of every kind of obstacle valiantly pushes on." He expressed the hope that he could be present before the show was over, but declared that he wouldn't be present until a satisfactory agreement had been "signed, sealed, and delivered."

JULIAN D. CONOVER
Secretary, American Mining Congress

Roy L. Cox, vice president in charge of mining sales of The Jeffrey Manufacturing Company, and chairman of the Manufacturers Division of the American Mining Congress, after welcoming those present at the convention, pointed out how earnestly the manufacturers are endeavoring to cooperate with the coal-mining industry in solving its problems. He said, "No one better realizes how much conditions have changed from 15 years ago than we manufacturers who are constantly in the field. We are, all of us, earnestly trying to help you solve your problems, and are definitely and sincerely interested in the progress of the coal industry. We want to do our part in helping this industry to meet the stiff competition with which it is faced.

"These annual meetings are a real factor in helping us do this—they are a clearing house of information of the greatest possible value to both operators and manufacturers. The American Mining Congress has rendered invaluable service in bringing the operators and manufacturers together for these discussions, and the annual expositions have been a definite stimulus to the development of better equipment for every phase of coal mining.

"I am sure I am speaking in behalf of all the manufacturers when I say that we are with you to the hilt, and that we stand ready to do everything in our power to help in the work of

the American Mining Congress which means so much to this great industry."

A digest of each of the papers presented during the four-day session, classified into various branches of mine operation, follows.

Mechanical Loading

Mechanical Loading of Domestic Coal in the Springfield (Illinois) District, By George M. Smith, mine superintendent, Peabody Coal Company.

The Springfield district mines are operated in the number five vein in Central Illinois, the coal ranging from 5 ft. 2 in. to 6 ft. in thickness. Immediately overlying the coal seam there is a stratum of black slate ranging from 2½ ft. to 4 ft. in thickness. At irregular intervals in the coal appear clay veins ranging from a few inches to three or four feet in thickness that are known locally as horsebacks or slips. Due to the presence of these horsebacks in the coal, which are sometimes very hard and flinty, there was no attempt made to cut coal with mining machines, the method having been to shoot the coal off the solid and load into pit cars by hand.

In 1928 the Peabody Coal Company installed short-wall machines in their No. 51 mine while the mine was still on a tonnage basis, the miners being compelled to snub by sledge and wedge. With the advent of the pit car loader the following year, the snubbing by hand was discontinued and the coal was then snubbed by drilling snubbing shots, which did not produce as high a percentage of large size coal. The necessity of producing a maximum amount of lump coal led to the installation of track-mounted shearing machines with a 9-ft. cutter bar.

The mines are worked on the room and pillar system, with cross entries driven off the main entry at 1,250-ft. intervals, and the rooms are worked by the advanced face or step system. Cost of shearing, drilling and shooting, including explosives, was practically the same as preparing under-cut coal for loading, due to the increased cost on under cutting the coal.

Caterpillar and track-mounted loaders are used in the district, the latter type having been more efficient due to scattered coal. All coal is shot out free from the face and is easily loaded, the machines having very little digging to do.

All track and switches are laid with steel ties, with the rail and ties trenched in the clay to the depth of height of rail, in order to conserve height.

The advantages of mechanical loading over hand or conveyor loading in this district are that operations can be confined to a much smaller area, closer supervision can be maintained over drilling, shooting and timbering in working places, there is a larger production per man employed and a lower production cost.

Symposium on Gathering Haulage

Two Years' Experience with Rubber-tired Gathering Equipment, by W. A. Vinson, general superintendent, Hart Coal Company, Inc.

Faced with stiff competition from neighboring mines in Ohio, the Hart Coal Company, which mines coal near Mortons Gap, Ky., decided to mechanize its property, calling on J. H. Fletcher, consulting engineer in Chicago, who in previous years had made two reports on mechanizing the Hart property that indicated the mines

NEWELL G. ALFORD
Chairman of the session on Mechanical Loading

should continue on hand loading. Mr. Hart returned from Chicago with a pencil sketch on the back of an envelope which had been made at a luncheon engagement, and announced that that was the system of mining he was going to install. Mr. Fletcher had developed a simple system of getting the coal away from the loading machine and supplies back to the working face, which was outlined on the envelope.

Preparation for installation of mechanical loading was largely a question of selecting the section of mine in which to start, and a list of the men believed most adaptable to a change from hand to mechanical loading. Undoubtedly the immediate success of the operation was in no small part due to the care used in selecting the crew.

In the selection of equipment, a great deal of consideration was given to the question of a conveyor bottom trailer with 40 to 60 seconds' delay at the transfer point compared with 10 seconds' delay using drop bottom trailers and a hopper type transfer station. The pit was selected as the lesser of the two evils. The trailers were less expensive, lighter in weight and there was more flexibility at the dump point when loading into the 1¼-ton capacity car with which the mine was equipped. With conveyor bottom trailers there would be an extra operating delay of at least 120 minutes without considering the loss of time that would occur when two tractor-trailers arrived at the same time.

The Fletcher system of mining has a strong appeal to the operating crews. Competition between the loading units to secure the greater number of trailer loads is as intense today as when the equipment was first installed.

The system is so simple that undoubtedly the majority of the several hundred operators who have visited the mine have gone away with the idea that "It's all right for Hart but can't be used in our mine." We find that if we keep within the haulage radius for which the equipment was designed we can use most any mine layout and secure a good tonnage per man employed.

Equipment at this mine has been worked at full capacity without spare units, and only the third shift and Sundays to make repairs, other than temporary. During the period it has been in service it has been called upon for the equivalent of five years' single shift time of the average mine. The mine was able to meet competition in coal prices and operate 520 shifts in 1938, which is the real acid test.

Dual System of Haulage with Service Cars, by John H. Evans, mine superintendent, Wasson Coal Company.

Located at Harrisburg, Ill., the Wasson Coal Company is mining the Illinois No. 5 seam, which varies in thickness from 54" to 72", with an average of about 60".

In changing the mine from hand loading to mechanical loading, it was decided to use track-mounted cutting machines, allowing cutting to be done directly under draw rock, which then could be moved before shooting. In parts of the mine where draw rock is thin or failed to come after cutting, serious difficulty was experienced in loading into the regular mine car. In

addition, insufficient space was available between the car and mine top to permit lump coal to be loaded. For these and other reasons the management was compelled to consider a different type of mine car. Coal is brought to the surface in cars hoisted on cages, and due to the size of the mine shaft, any change in width or length of car was limited to what we were then using.

A dual system of haulage was decided upon, providing for the use of large dump bottom cars behind the loading machine, and retaining the original mine car equipment for the main haulage and hoisting cycles. The new equipment consisted of 16 bottom dump cars of the 1-2-3-automatic type, a dump hopper, feeder and trip loader. The car is 12′ long by 6′ wide on the outside of car, and 30″ above top of rail. It has a capacity of 3 to 4 tons according to surcharge placed on top of car.

Prior to the installation of the dual system the machines in this section were loading an average of 156 tons per day. Since the installation we have maintained an average tonnage of 225 tons per machine.

Twelve cars are in service at the present, divided into 4 trips of 3 cars each. Three cars have been found to be enough for the distance of the haul so far, but as the trip becomes longer an extra car will be added. This system was put into operation November 1937, and has up until March 1, 1939, transferred from large to small car, 160,000 tons of coal. It is our belief that we will be able to handle about 300,000 tons of coal with the hopper in its present location.

One Thousand Shifts with a 10-Ton Mine Car, by S. M. Cassidy, manager, Weirton Coal Company.

The unusual size and construction features of the large cars used at the Isabella mine of the Weirton Coal Company have aroused much interest, and it is believed to be the largest car used in regular loading at the face of any underground coal mine in the United States. Manufactured by the Differential Steel Car Company, the car was designed for 10 tons of coal or 12 tons of slate, mechanically loaded. Actual average over a long period is around 9.2 tons of coal. Average turnover is 3 per day, number of cars is 182 and average round trip haul is approximately 5 miles.

Although particular attention was paid in design to make the car stick to the track, actual results have far exceeded expectations despite track work that can by no means be classed as good. During February and March there was an average of one derailment per shift, and it usually requires 10 to 20 minutes to rerail a car.

Most common causes of derailments are dirty switches and places where one rail is at a decidedly different elevation than the opposite rail. Track otherwise can be crooked, kinked, surface bent and dirty—but the cars will stick. A loaded car rarely derails.

Principal reasons for the cars staying on the track comprise the type of trucks used and the spring action.

One particularly desirable feature of this type of equipment is the less chance of knocking out posts and letting down the beams and draw slate.

Another reason for choosing as large a car as possible was to permit medium slow gathering speed without sacrificing loader capacity to car shifting time.

While the speed chosen has proved satisfactory the fear about car derailments knocking off timbers has been found to be almost groundless.

A question frequently asked is relative to the 10-inch diameter wheels and sealed-for-life ball bearings. Nothing much can be said because so far there has not been a single wheel or bearing replacement.

A rotary dump is used, so the body is solid and is constructed practically water tight to eliminate coal dribble.

So far there has not been a single lost-time accident or one cent of cost to the compensation department chargeable to these mine cars, either directly or indirectly, this covering all handling of the cars, rerailing, repairs, coupling and uncoupling.

When the 10-ton cars were on order, and even after being put in service, there was considerable skepticism. One such visitor was taken in the mine to see the cars in operation and after watching them, shook his head and remarked, "Well, I still don't believe it."

Selective Mining at Raleigh-Wyoming Company, by Carl Scholz, consulting engineer, Charleston, W. Va.

The No. 1 mine at Edwight, W. Va., was opened a number of years ago in the Eagle seam. Over a period of time various systems of mining were employed, but because of the impurities carried by the coal seam, a tender roof and a heavy overburden, none of these methods was entirely satisfactory to the management.

A. J. RUFFINI
Chairman of the Wednesday morning session

With the equipment available at the mine, experimental work was done in 1937 to develop a system of selective mining in which all of the material above the coal—draw slate, bone and laminated coal—was removed from the seam at the face before loading of the bottom bench of coal was attempted. This was essential since the preparation plant did not include mechanical cleaning equipment.

Early in 1938 mechanized equipment was installed in the mine. One type machine cuts out and loads the 12 inches of bone and rash and upon completion of this rakes out the upper 6 to 12 inches of draw slate. A loading machine then loads out the draw slate. This work is done on the night shift and the loader, because of its high loading rate and exceptional tramming speed, handles about 40 to 60 cars of slate from 20 places in the average time of approximately 5 hours. The kerf is then bugdusted and the face of the bottom bench of coal and pavement directly in front thoroughly swept before the bottom bench of coal is drilled and shot.

The bottom bench of clean coal is now ready to be loaded out with the loading machine and for a run of two months' duration the loading averaged 460 tons of coal per 7-hour shift. In addition to this duty the machine was required on the night shift to enter every place and load out the draw slate and other refuse as described above.

Complementing these production units, additional gobbing machines and loading machines are successfully used in rapid development work driving the entries and the next room entry ahead of the production machines. This work must be done immediately ahead

of room coal extraction as it is inadvisable, because of roof conditions, to develop and maintain room entries for any appreciable length of time.

Conveyor Mining

Engineering Studies and Conveyor Cost Analyses, by T. F. McCarthy, general superintendent, Clearfield Bituminous Coal Corporation; and C. P. Brinton, mining engineer, Barnes and Tucker Company.

Engineering studies must deal with specific facts that may be presented or described as a preliminary study. The data may be original or obtained from operations where conditions are similar to the one about which the setting is being made; if such is the case, a detail study of the various main items should be made, by careful analysis as was provided for in time study form sheets.

A single unit study requires detail analysis, for upon the efficiently working single unit depends the success of all operations, whatever the grouping or arranging of units. At any mine where conveyors are being operated, performance studies should be made at regular intervals. Items listed should correspond with the American Mining Congress' Coal Division Conveyor Committee Standard Time Study Form Sheet. This sheet was carefully made out, and should be used as a medium of exchange for reliable information between operating companies; also for a comparison of corresponding tasks as provided in this section of your mine by this crew of workmen.

Main items of the study include: (a) track arrangement at loading point of main belt showing the mechanically controlled movement of cars; (b) system of ventilation, which must be positive and capable of conducting a large volume of fresh air across the working faces; (c) the wiring layout, which must meet the rigid requirements of flame proof specifications inby the loading point along the heading; (d) electrical set-up for a typical room for advancing and retreating; (e) scheme of timbering for the advancing face, showing the standard system of timbering with placing of safety posts; (f) additional timbering required when the pillar is being brought back, how the break lines are controlled, and after first break occurs, the changing in the scheme of mining, and (g) single unit arrangement to form a multiple installation as in actual working set-ups.

Safety must be given important consideration. The presence of machinery requires certain specific rules for safely performing certain tasks. Certain supplies are necessary for the performance of these tasks in a safe manner.

With the trend of rapidly increasing mechanization, the tangible thing for the operating companies to do is plan a system of education for their key men and supervisory force. The ground work for the training should be the study of items set up on the form sheet mentioned above. The state colleges and universities under the Mineral Industries Extension Division may be willing to help organize and supervise in this instruction. By the organization of such training, two objects may be obtained—namely, the selection of men to take the course and to offer colleges and universities a more intimate contact with men who may desire to complete a college course.

Symposium on Conveyor Loading

Mechanical Loading on Conveyors, by Harold McDermott, vice president, New Castle Coal Company and Stith Coal Company.

In Alabama, mechanical loading equipment meets its real test, with unfavorable conditions including (a) very thin seams, (b) thick seams with very heavy rock partings and (c) bad roof conditions.

Summary of our experience over 29 months leads us to believe that with average output in excess of 140 tons per day the loader operation is to be preferred even in a dirty seam. This can be readily accomplished with average roof conditions, with an average crew of 16 men in either 40-ft. faces with loader delivering directly to room conveyor or 70-ft. faces with a face conveyor, and with loader operating at 70 percent of rated minimum capacity.

Mechanical loading should never be mixed with hand loading in the same section of the mine.

Comparison between hand loading and mechanical loading in the shaft mine of the Stith Coal Company at America, Ala., speaks well for mechanical loading. [Detailed methods then outlined.] During the period September 1, 1938, to January 31, 1939, the cost per ton and tons per man were as follows: For hand loading in mine cars, cost per ton 72.8c, and tons per man 7.06; for mobile loading on conveyors, cost per ton 48.8c, and tons per man 11.3.

Most of the hand loaded coal was mined from 40-ft. rooms and a few 30-ft. headings. All the mechanical coal was mined from 24-ft. headings. We believe that a better cost could be made if it had been possible during this period to use mechanical equipment in rooms as well as headings, for one haulage locomotive could handle two units in place of one, and one mobile loader could serve more than two working places.

The mechanical equipment tends to concentrate the workmen, promotes closer supervision and exposes fewer men to the hazards of coal mining. The faster rate of advance obtained by this method requires less territory to be in active operation for the same tonnage and shows a saving in track and ventilation maintenance. A smaller number of cars are needed for the same tonnage, as the cars are not held as long at the loading point, and are gathered in trips instead of one at a time. The increased tons per man is a saving under the present social security and unemployment taxes.

Conveyor Mining With Hand Loading, by Andy F. Whitt, general superintendent, West Virginia Coal and Coke Corporation.

Faced with removal of great amounts of slate and rock to make it possible to mine coal profitably, the West Virginia Coal and Coke Corporation was forced to revamp its mining methods in developing one section of its Rossmore mine in Logan County, West Virginia. The coal seam being mined at this operation was separated by a vein of middle slate a few inches thick which increases to 15 feet about two miles ahead of the present workings in this section.

In the past, mining has been done by usual hand methods which were carried to a point where the cost of handling rock and heavy yardage pay-

THOS. G. FREAR
Chairman of the session on Conveyor Mining

ments made mining unprofitable. Some work has been done in attempting to mine only the lower bench by hand mining and one test conveyor installation was tried.

Existing equipment and adverse roof conditions did not permit the desired results in hand mining. On the conveyor installation the output was restricted by the close timbering necessary, due to the nature of the parting which formed the roof. In view of this it was decided to develop a panel in the full seam, where the parting is 20″ to 22″ thick, by driving a set of 4 entries, 2,000 feet long. These entries have now been driven one-half of this distance using the bench method of mining, in which the top and bottom benches of coal and the middle slate are mined in successive stages. A battery of four shaking conveyors, equipped with swivel pans at the loading end, convey the coal from each entry face to a gathering chain conveyor which carries it into the mine cars on one of the side entries. The coal is loaded onto the conveyors by hand and the section works on two shifts.

With this system of mining we are able to avoid handling a large quantity of slate to the outside and to secure a better prepared coal.

Self-Loading Conveyors, by T. F. Christian, general superintendent, West Kentucky Coal Company.

In 1936 the West Kentucky Coal Company decided to mechanize their No. 8 mine at Sturgis, Ky. This mine is in the No. 9 seam which averages 55 inches in height in this locality. The seam lays on an 8 percent pitch. The main slope entries are driven down the pitch and cross entries turned at 90°. Three entries are driven to the boundary. The bottom entry is used for an air course and the middle and upper ones used for haulage. Rooms are turned off of the upper entry and driven up the pitch.

Two units of shaker conveyors with duckbills were purchased and installed and shortly thereafter 10 more were ordered. At first we used this equipment in development which had been done under hand loading. In that case rooms were extracted as the entries were projected. Now we have found it economically possible, since entry can be advanced at the rate of 25 feet per shift, to drive our cross-entries to the boundary and work rooms back toward the main slope entries. All subsequent development is being laid out this way.

We find that by retreating with room work the recovery is greater than is the case in advancing. Cross-over switches are installed at regular intervals between the track in the middle and upper entries. Units of conveyors are placed far enough apart for a large enough trip of cars to be spotted between units. Shaker drives are set in room necks which have been driven in two cuts while the entry is being developed. Hand loading is necessary until the room is advanced approximately 35 feet. It is interesting to note here that during the time hand loading is done, to make room for installation of the duckbill, production from the unit is only about 40 percent of what it is after the duckbill is installed.

Another interesting result of this practice is in the percentage of sizes. In this seam the premium sizes are the larger sizes and, therefore, it is of paramount importance that we prepare as much lump coal as possible. Our percentage of sizes compares with the sizes obtained when the mine was on a hand loading basis. We believe this is unusual for any kind of loading equipment. We have just purchased the thirteenth unit.

Roof Problems

Guniting to Prevent Slate Falls, by C. W. Jeffers, general superintendent, United States Coal Company.

There are several reasons why the coal industry should become more conscious of gunite and profit by more extensive use of it. It is cheaper than permanent timbering and much less expensive to maintain. It makes a safe motor road ideally adapted to the fast haulage of the modern mine. In the event of derailments and wrecks the danger of tearing out the timbers is eliminated. The fire resisting quality of gunite protects the roof and ribs against fire while the presence of timber increases this hazard. Gunite also improves illumination.

The question of whether it is cheaper to gunite or timber depends on what a good job of permanent timbering costs in the mine under consideration and the expense necessary for proper maintenance. The life of the entry is of primary importance. I do not feel in our district it would pay to gunite an entry the estimated life of which is less than six or seven years, as temporary timbering would probably be all that would be necessary.

Do not forget the item of maintenance—it is extremely important. Early experimental work clearly demonstrated the necessity of carefully maintaining the seal. Gunite should

D. H. PAPE
Chairman of the Tuesday morning session

be examined each year and all surface checks, cracks and broken places repaired.

Particular difficulties encountered by the company in applying gunite comprise: troubles in its application in wet places, and the question of what to do on extremely old ribs which have deteriorated so badly that it is almost impossible to dig and scale back to solid surfaces. Both these difficulties have been surmounted by methods outlined.

It is necessary that the surface be properly prepared before the application of gunite—all the loose material should be taken down and all slacked and deteriorated surfaces should be removed. The final scaling should be done on the same shift and right ahead of the nozzle to insure the surface being fresh before sealed. Early failures have been traced to the lack of proper preparation. Also, experienced men should be used to apply gunite.

Gunite is the answer for permanent entries and helps to solve the very mean problem of main line maintenance.

Roof Problems and Timber Recovery, by George A. Brown, mine superintendent, The Union Pacific Coal Company, Superior, Wyo.

In mines of the Union Pacific Coal Company, there are roof conditions of all kinds which require different methods of timbering for roof support. The pitch, character of the material underlying the coal seams, and the systems of mining enter into the problems of timbering and withdrawal of timbers systematically on retreat as much as the composition of the roof itself.

When the Union Pacific Coal Company decided to change from hand

mining and loading to mechanical loading, it was soon apparent that radical changes would have to be made relative to roof problems from a safety and a practical operating standpoint. Different systems of timbering were tested and, after many months of trial and study, systematic methods of timbering were adopted to meet the different mining and roof conditions.

The ease with which new and inexperienced men became familiar with a timbering system is gratifying to a foreman. This developed inexperienced employes rapidly into useful and valuable workmen, and brings more forcibly to the attention of these men the necessity of constantly inspecting the roof—a very important factor, as it is well known that more accidents are caused from falls of roof than from any other cause.

In areas where recovery is permissible, the extent of that recovery depends very largely upon supervision. The same may be said about the recovery of timber. However, both of these activities are materially facilitated where the advance work has been done under an adequate systematic timbering plan. To secure the greatest efficiency and cooperation from workmen in carrying out a plan of systematic timbering, it has been found particularly advantageous to secure timber, caps, wedges, etc., of suitable lengths, ready cut.

Systematic timber recovery is one of the most essential operations of coal mining, as well as one of the most hazardous, and it requires as much or more study than the placing of the timber originally. One of the main factors in timber recovery is, of course, the saving that can be accomplished by using the same timber over again. There is also the relief of weight and proper caving, thus preventing squeezes and loss of pillar coal.

In the recovery of timber, the choice of men is one of the most important considerations, as only men of known experience should be used on this class of work. It is customary for us to use three men on this kind of work, two who are experienced and one whom we expect to train so as to have available a certain number of men who are capable and trustworthy.

Timber should be pulled at the proper time to get the maximum recovery, and work of this kind should be more or less standardized and not left to the judgment of any one person.

The average amount of timber used in our mines per ton of coal extracted averages 20" to the ton for props alone, cost around 10 cents per ton. Our recovery averages around 50 percent.

In the writer's opinion, systematic timbering and standardizing of work, and the cooperation of our men and management, from the top down, has been responsible for what success we have attained from an operating and safety standpoint. Safety in operation is our slogan.

Strip Mining

New Development in Coal Stripping, by C. M. Guthrie, superintendent, Seneca Coal Company, Broken Arrow, Okla.

The development of machinery and equipment for strip coal mining has been very rapid. The modern stripping shovel has grown from a one-half-yard dipper of 20 years ago to the enormous 32-yard dippers of today. Necessarily the other equipment used in this method of mining has grown proportionately.

Truck haulage six years ago was accomplished by using many small units of from six to eight tons capacity. Then came the development of the 15-, 25- and 35-ton semi-trailer coal haulage unit, in operating which speed was sacrificed for greater pay load, and reduction in units required was not proportionate to the increased pay load.

New equipment that has entered into strip coal mining within the last year includes an 80-ton capacity semi-trailer; a new type of shovel with knee action front end, and a new mechanical loader on crawler tract.

The Dart Truck Company and the General Electric Company have developed a gas-electric combination by using two engines, the same as in the 40-ton unit, in conjunction with two electric generators and motors, that is capable of moving 80 tons per load and maintaining the same speed and gradeability as had in the 40-ton units.

The new type 480 Marion Coal Loader is a shovel type with a new knee action front end equipment. This machine was placed in operation in June of 1938, since when the capacity has been increased from 3½ yards to 4¼ yards. It has a clean-up radius on the coal face of approximately 17 feet with a dumping height of 19 feet 6 inches and a dumping reach from the center of the machine of 41 feet 8 inches.

The new type 11 BU Joy Loader has been equipped with a 4-ft. extension on the loading conveyor and is now loading from an 18-in. vein of coal into six-ton semi-trailers. It has been capable of maintaining an average of 117 tons per hour capacity in this operation, loading a good clean product free from fire clay, impurities, and maintaining a decided advantage in lump percentage over shovel type or thrust boom equipment originally used in the operation.

Shop Practice and Machine Maintenance

Machine Maintenance, Practices, Procedure and Records, by Ernest Prudent, electrical engineer, Bell and Zoller Coal and Mining Company.

Maintenance of mining equipment due to mechanization is rapidly becoming a specialized phase of the mining industry. Practices are governed to a large extent by the type and size of the mining operation. Large operations are at a disadvantage to the smaller operations inasmuch as more equipment and service men are involved. However, operations on a large scale do have the advantage of being able to set up departments within the maintenance department with maintenance men specially trained in one or more specialized vocations.

Detailed descriptions are given of practices employed at a shaft operation with an average 7-hour capacity of 7,500 net tons of washed coal, the mine being fully mechanized with 20 mobile type loaders, 20 mining machines, 50 mine locomotives, 9 generator sets, coal drills and auxiliary equipment.

Inside repairmen on the day shift comprise one man for each of the five sections for emergency repairs. At the end of the work-day these repairmen spend a few minutes of their time in making written reports regarding any equipment failure.

Inside night repairmen comprise two men who are given one section to serve, their work consisting of repairing and lubricating loading machines plus minor repairs to mining machines and drills. Preparedness plays an important part in maintenance service. In order that repairs be made promptly, every repair job of any consequence should be carefully analyzed. This analysis will guide the maintenance men in being prepared. Essentials of preparedness for repair work at the working face are: knowledge of the exact nature of the repair work, location of the machine, proper materials to use, proper tools to work with and competent service men who are familiar with the work.

Accurate records are kept at our operation with respect to armature rewinds, locomotive wheels and axles, cables, mining machines, mine locomo-

tives, location and needed repairs to loading machines, mining machines and drills, inside day man's reports, daily tonnage and delay reports, lubrication, and reports made out by inside substation attendants.

The accounting department furnishes the supervisor of the maintenance department a cost statement each month showing the maintenance cost of each loading machine and the lubrication cost, as well as a statement showing total tonnage loaded, daily average tonnage, average weight of mine cars and the tons yielded per shell used in preparation for each loading machine.

By watching these monthly statements I have found five important factors which govern to a large extent maintenance cost of the loading machine—namely, (1) Proper preparation of coal to be loaded; (2) power; (3) careful operation; (4) proper maintenance; and (5) close, rigid, weekly inspection of equipment. Lowering the standard of the work performed as connected with any of the five factors mentioned, seriously affects the results that should be obtained from the remaining four factors.

Use of Oxyacetylene and Electric Welding for Mine Equipment Repair, by D. N. Smith, assistant superintendent of maintenance, The Hudson Coal Company.

Before the oxyacetylene and electric arc welding processes were invented and perfected, large quantities of worn, cracked or broken machine parts were scrapped because the cost of repair in the blacksmith and machine shops was either impracticable or exceeded cost of replacements. The art of welding has changed this situation.

Under controlled procedure in a shop, it is possible to obtain uniform welds having the same physical characteristics as the parent metal by a welder of ordinary skill and intelligence; but in our industry, where the work is not confined to the shop and is so diversified as to require the employment of all the welding arts, it is imperative to have highly skilled and intelligent welders to obtain such welds. To promote the efficiency of this division of maintenance work, the personnel must be kept advised of and trained in all current developments, and the engineering services offered by the reputable manufacturers of welding apparatus are invaluable for this purpose. It is equally important to keep in touch with the improvements that are being continually made in the quality and character of the welding supplies.

The flame cutting and welding processes are used to good advantage in a wide variety of construction and repair work in other places than our shops. The oxyacetylene cutting torch is an indispensable tool for emergency demolition, occasion for which frequently arises in mining operations. With it, twisted steel can be cut into sections for easy handling, pipe lines can be cut apart, etc. To do the same job with an air hammer or old-type cutter and sledge would mean a loss of three or four days.

Safety and Supervision

Safety Rules, Standards and Inspection, by J. J. Sellers, vice president, Virginia Iron, Coal and Coke Company.

Rules for coal mine safety as drawn up by the Committee on Safety of the Coal Division of the American Mining Congress were outlined. After final action is taken by the committee on the proposed detailed safety rules and they receive the approval of the Coal Division as a whole, they will be available to coal mining companies to use as a basis for preparation or revision of their own detailed safety rules.

Safety rules of a mine should be made sufficiently elaborate to cover all phases of mining operations performed by the mine employe, so that there can be no question or doubt as to what is expected of the employe in the attainment of safe operation of the mine and prevention of accidents. Every mine employe should be given a copy of the rules and be required to sign a receipt therefor and urged to study them carefully. Disciplinary measures should be taken with any employes found guilty of violating any of the rules. Only by strict enforcement can the desired results be accomplished.

CHAS. W. CONNOR
Chairman of the session on Safety

The supervisory personnel of the mine should be required to study and *know* the safety rules of the mine. Without enforcement, safety rules are virtually worthless.

The carrying out of the requirements of safety rules and standards is as much the responsibility of the employer as the employe. A lack of enforcement on the part of the supervisory personnel reflects on the mine management and invites dangerous infractions on the part of the employe.

A system of mine inspection is an essential part of accident prevention and determines the extent to which compliance with the requirements of safety rules and standards is being realized on the part of both the supervisory personnel and the mine employes. Reports on forms provided for the purpose should be made by safety inspectors covering each section of the mine. These inspections should be made frequently, as only through this means can the mine management be assured of effective compliance with safety rules and standards.

My company recently adopted a system of rating each section of each mine with regard to compliance with safety requirements. Under this system a percentage of proficency is computed for each section, based on the number of unsafe or substandard conditions found by the safety inspector. This system has produced remarkable results and has helped to keep the section foremen ever alert for unsafe conditions and practices.

Securing and Maintaining Employe Cooperation in Safety Work, by C. J. Flippen, safety director, Fuel Department, N and W Railway.

No safety program can be successful without a large measure of cooperation from the employe. Cooperation may be defined as joint action, or a working together to attain an object of common interest, or where two or more groups desire the same objective and work together jointly to that end.

If the sole bond between two or more groups be selfishness, or self-interest, then there can be no successful cooperation between them because there is no common interest—no common goal. The way to a common objective must be an unselfish, broad minded approach, with a sympathetic

understanding of the other fellow's problems.

Cooperative effort is the responsibility of the management and should not be shifted to other shoulders, for when management fails to keep striving—when patience fails—when a belief and hope in the final attainment of close cooperation fails, then all is lost. It is the duty, then, to influence the employe groups to cooperate with the organization in striving for safety and efficient operation, safety being a part of efficient operation.

We should strive for cooperation by trying to modify the desires of the employes and of the management so that what the management wants will in time come to mean what both want. This sameness of purpose may not come in a short time, so many different factors having to be considered. If our efforts to influence employes toward a better spirit of cooperation are too obvious, or if it appears that we are trying to make a change instead of inducing it, we may fail in our purpose. Safety work cannot be handled by the same kind of methods we use to get production and cost.

In the perpetuation of cooperation, all of the individuals of the different groups should share the honors and credits and take the blame for bad results. No one man has a monopoly on brains and ideas.

Confidence in efficient management methods is the key to continued cooperation.

Organizing the Supervision of Mechanized Mining, by Frank E. Christopher, president, Christopher Mining Company.

Notwithstanding the remarkable efficiency of modern mining machinery, the ultimate success of a mechanical coal mining operation depends upon the ability and the effort of the human element employed throughout the entire plant.

The proper type of supervision is that which puts properly designed, well maintained machinery into the hands of capable honest employes following a well planned mining system and furnished with ample supplies and ample power.

Supervision of mechanical mining requires ability, training, tact and character—the last being not the least important. Such supervisors will hire miners of good character and ability and so build an able, trustworthy organization capable of getting the best results from mechanical mining. If the supervision is not of the proper type there is no assurance that a mechanical mining operation will show a low cost even though the mining conditions are ideal, the investment in the best and latest kinds of machinery is ample, and the power and supplies of all kinds are abundant. The success of mechanical mining depends upon the factors of individual efficiency, cooperation and coordination.

The supervision of mechanized mining naturally branches into two general divisions. There should be a division of maintenance and a division of operation. There should be one man responsible for each division, to have complete twenty-four hour control over his particular division no matter how many shifts are worked, and the head of each division should be responsible directly to the management.

Organizing the supervision of mechanized mining is not a work that can be done and then forgotten. It is an endless job. The management should give praise where praise is deserved, and should supply constructive criticism where needed. It is important that the entire force of supervisors should be conscious of the personal interest which the management has not only in the results which they attain but in each of them as individuals. With such an organization and such a spirit, success will be assured.

Surface Preparation

Coal Preparation, by P. D. Everly, superintendent of preparation, Island Creek Coal Company.

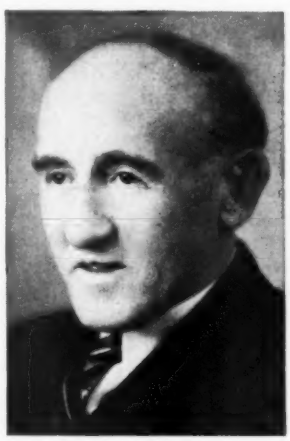
Describes briefly the latest and, in many respects, the most complete of five preparation plants built by Island Creek at the mines at Holden, W. Va.

This plant is located at Mine No. 1 and is designed to handle an output of 500 tons of prepared coal per hour. It is of steel and concrete construction, and was built by Roberts & Schaefer of Chicago, Ill. Outstandings feature of this plant are: Surplus washing capacity, cleanliness (due to dust collection facilities), thinning and blending equipment and crushing and rescreening of crushed coal. After building four preparation plants we were able to capitalize on our experience and include the good features of the different plants in this last construction; likewise, we were able to eliminate any objectionable features encountered in our previous construction.

One pertinent idea that I would like to get across here is—that because one type or size of cleaning equipment is entirely satisfactory for one coal or mine, the same equipment may not be adequate for coal from the same seam in an adjacent mine.

Principal features of the plant include wet-washing of the 5-in. by ¼-in. coal by three Roberts & Schaefer hydros, which can be used either as primary washers or, if the nature of the raw feed permits, can be used as primary and secondary washers. Material from the secondary draw is sent to a Jeffrey three-compartment jig, with the float of this machine joining the float of the three hydros. The final product of the hydros and jig are joined in sluiceways before going on to the classifying screen.

The ¼-in. x 0 coal after passing through the Tyler screen is conveyed directly to Stump Air-Flow boxes.



C. S. BLAIR
Chairman of the session on Surface Preparation

The minus 48 mesh dust is drawn from the hoods above the stump boxes and collected in a Pangborn dust collector.

One of the outstanding features of all of our preparation plants is our system of thinning and blending the minus 2-in. sizes. In all cases this coal is broken down into three sizes, each of which is binned in a separate bin of 125-ton capacity. From these the coal can be loaded separately or can be blended with any other size.

Another feature of this plant is the set-up for crushing any of the sizes and then rescreening the crushed coal. We can produce egg, nut, stoker and pulverizer from the crushed coal. Such flexibility enables us to meet practically any market condition arising.

Some Factors Affecting Results When Air-Cleaning Fine Coal, by D. H. Davis, chief chemist, and V. D. Hanson, assistant preparation engineer, Pittsburgh Coal Company.

Paper summarizes the operating conditions and results obtained when air-cleaning minus ⅜-in. and minus 5/16-in. coal at the Champion preparation plant of the Pittsburgh Coal Company, at Negley, Ohio. The paper is carried in full on pages 10 to 16 of this issue.

Dewatering to Prevent Freezing, by Otis Bledsoe, chief engineer, Binkley Mining Co.

The Binkley Mining Co. of Missouri, has recently extended preparation facilities at its plant near Bevier, Mo., to include drying of the ¾-in. x ½-in. minus washed coal. The drying plant was engineered and built by the McNally-Pittsburg Mfg. Corp., and incorporates the most recent developments in coal drying equipment, including two of the new McNally-Vissac driers.

These driers consist essentially of an inclined reciprocating unit, surfaced with wedge-wire drainage screen in somewhat the same manner as dewatering screens.

The removal of moisture is effected by the passing of hot furnace gases, tempered with cold air, down through the bed of wet coal. Two distinct dewatering operations are involved—the rapid oblique motion of the deck tends to loosen the coal bed while the suction pressure beneath tends to compact the bed. Controlled intermittent application of suction pressure results in a cycle characterized by an interval during which the coal bed is compact followed by an interval of relatively loose suspension.

Hoods are attached to the screens above and hoppers are attached below, effecting a complete enclosure of the screens except for openings to allow entry of the wet coal and discharge of the dried coal.

Water sealed drains in the bottom of the collecting chamber provide for evacuation of the moisture removed mechanically, while the evaporated moisture and gases are exhausted through the fan to the external atmosphere.

The discharge of coal occurs approximately 40 seconds after its inception into the drying unit, the wet coal feed averaging 94 tons per hour and the dry coal discharge averaging 88 tons per hour.

Dried coal is used as fuel in the furnace. It is obtained by means of a chute from the dry run of the wet-dry conveyor. During normal operation, fuel consumption is 1,000 pounds of coal per hour.

National Economic Problems

The Benefits of Mechanization, by L. E. Young, vice president, Pittsburgh Coal Company.

A large part of the benefits and savings resulting from modernization and mechanization have been passed on to the consumer and the general public. Undoubtedly this will continue, but concerted efforts should be made to have the real story of mechanization presented to all those who will ultimately benefit substantially by mechanization.

It is important that the advantages and disadvantages of mechanization from the viewpoint of the mine worker be studied and the true picture be presented to the mine workers. One of the best ways to present this is locally through the mine management.

It is therefore vital that the mine management understand the economic problems and results of mechanization and, as well, the ultimate disaster that befalls districts that do not modernize.

Before real public support of mechanization can be developed it will be necessary to show the leaders among the mine workers that mechanization will "save jobs" and mechanization will "make jobs." A large part of the opposition to the installation and efficient use of new equipment can be converted into enthusiastic support if proper steps are taken.

It is not the purpose of the writer to minimize the hazards of mechanization, but it is his firm conviction that the face worker labors with less chance of injury in a well-managed mechanized mine than in a well-managed hand mine.

The foregoing statements show that the mine worker is benefited substantially by the introduction and use of mobile loaders, conveyors, and the auxiliary equipment required to serve them. For these reasons it is anticipated that when all the facts are known, the mine workers will cooperate fully in programs of mechanization which are planned primarily to save the industry from disastrous competition.

The importance of the bituminous coal mining industry to the states and local communities in which coal mines are located requires little discussion—a protracted suspension soon shows how wide-reaching are the influences of the bituminous coal industry. The failure of mines to meet payrolls and to pay taxes brings suffering and want, and results in the closing of schools or the reduction of school terms. When the coal mines do not prosper it usually results in poor roads, poor sanitation, privation and decadence of the community.

Mechanization has brought relief to some decadent districts, it has given new life to communities, and it has made possible the opening of thin seams in areas in which all the merchantable thick coal has been mined. When threatened by the competition of open-pit mines, the shaft mines of Illinois and Indiana have been able to survive solely because of the introduction of mobile loading machines. If it had not been for the courage and vigor of leaders of the industry, schools, hospitals, asylums, and other eleemosynary institutions would have been jeopardized. Public officials and business men of many coal districts should be given the facts and should be shown that mechanization may be a means of protecting the future of many communities.

It is a well-known fact that the railroads receive in freight a larger sum per ton of coal hauled than the operator receives for the coal itself. It should be evident to the management of the railroads that, if mechanization can be used to increase the production of bituminous coal, it will be decidedly to their advantage.

Whether the coal is owned by the farmer, the operating coal company or a land company, the continued operation of mines, the payment of royalties or rent, and the payment of taxes by coal operators means much to the investor and to the community. The abandonment of mine openings and the failure to drain or pump portions of coal fields frequently means not only the total loss of investment in such openings and underground development, but also the postponement of the working of adjacent coal lands and depreciation of values. In several instances it has been to the advantage of the land owner to assist in the financing of mechanization, because it appeared to be the only practical way of saving the original investment and make profitable operation eventually possible.

The intelligent development of the natural resources of a community is one of the true measures of its right to survive in the struggle for economic existence. However laudable may be

the development of new industries and new products, it is just as laudable and just as vital to preserve, protect, encourage, and assist the going industries and operations in a community, for they have contributed through payrolls and taxes to maintain the communities in prosperity and with self-respect.

There never was a time in the history of bituminous coal mining in the United States when the thoughtful analysis of its problems and the cooperation of all interested parties was more needed.

It is proposed, therefore, that the American Mining Congress undertake, in a systematic manner, to present the case of coal mine modernization and mechanization to the railroads, public utilities, land owners, communities, and mine workers, so that the heartiest cooperation among all interested parties may be developed.

Merits and Demerits of Federal Regulation of the Coal Industry, by Geo. B. Harrington, president, Chicago, Wilmington & Franklin Coal Co.

No one denies that a foremost problem of bituminous coal today is that of federal regulation under the provisions of the Bituminous Coal Act, and the establishment of coal prices and marketing rules. The subject is not simple, and there is wide divergence of opinion on the problem within the industry. But all agree that the long delay in arriving at prices, or, more broadly, in arriving at a stabilized marketing policy, has been of tremendous handicap in an already difficult period.

Notwithstanding that American bituminous coal has blessed these United States with the most generous and cheapest supply of heat and energy in the world, we render a very competitive service and can expect to hold our leadership only if we successfully adjust ourselves to changing conditions and do not overlook opportunities for improvements, to assure a modern and dependable coal service at the lowest cost consistent with fair wages, reasonable profits and sound business principles.

As I see it, the business of supplying coal service at this period falls into three large divisions—the production of coal at the mines, transportation from the mines, and sale and distribution to the actual consumer.

On production, the industry has kept pace with technological improvements of mining and safety methods, has responded generously to government suggestions for shorter hours and higher wage rates, has shown great progress in holding down the cost of production in spite of these innovations and reduced output, and in general has given a pretty good account of itself.

Transportation from the mines is still chiefly by rail, and rail rates per ton are on the average higher than coal production costs at the mines. Rail rates are too high, both for the good of coal and for the best interests of the railroads.

It is in the third division of costs—those of sale and distribution—including as a cost to the industry the losses and wastes incurred through unwise and destructively competitive sales practices, that I believe lies the best and most immediate chance for the coal industry to make the important savings necessary before we can hope to regain our status as an economically successful institution.

At the present time the Coal Commission unquestionably is making a conscientious effort to arrive at price schedules and marketing rules that comply with the provisions of the Coal Act and that will stand up legally and accomplish the objective of yielding to the industry at least its average cost.

Realization has continued to sink and losses to mount. It is little wonder that criticism and dissatisfaction have grown to more than audible proportions.

Opponents of the act have formed an active Committee for Amendment which has gained wide support among the operators—t h o s e representing about 145,000,000 tons of the country's commercial tonnage, I believe, have signified their support.

With the exception of a comparatively few "rugged individualists," the record would seem to show a preponderance of belief that some governmental regulation is desirable.

As to the Guffey Act, proponents feel that its form "reflects majority opinion within the industry as to the best approach to the problem at this time" and that it was arrived at on the basis of more than 20 years' study of the coal problem, including 19 investigations or hearings by Congress or especially created commissions with respect to conditions in the industry.

As to workability, even the proponents admit that the price control provisions are extremely complicated and difficult of administration.

Progress of the Commission has been slow and the actual cost to the industry of administration has been heavy. I think that slowness by this kind of a public administration, particularly a brand new one handicapped by many legal uncertainties and lack of precedents, was to be expected, and that it should be put down as one of the so-called demerits of the regulatory process.

Another very live item in this problem is that of marketing agencies. The proponents of the Guffey Act feel that marketing agencies have been and will of necessity be ineffective, unless provided with authority to enforce, or so-called "teeth." The contrary view is that the Appalachian decision gives the necessary freedom to producers in a given region to act collectively, that the first agencies established after the Appalachian decision were proceeding satisfactorily and would by now be doing an acceptable job but for intervention of the NRA and the two subsequent Guffey Acts.

As to amendment of the Guffey Bill, it would seem to me inevitable that there will have to be amendments. The question on this point for the time being would seem to be whether, having gone to so much expense and taken so much time, we will let the Guffey formula have a chance to see how effective it can be and what amendments are indicated by experience.

It would seem to be a practical position to seek to utilize the present situation to build up our marketing agencies and other self-governing organizations as solidly as we can under the Guffey Act, and to cooperate with the Commission and among ourselves to give a convincing trial to the price-fixing formula on which so much time and money has been expended. Then we will be in the best position, I believe, to put our united effort and influence behind such amendments or repeals as experience indicates.

Stream Pollution, by J. W. Woomer, chief mining engineer, Hanna Coal Company of Ohio.

My conclusions and recommendations to the bituminous coal industry in stream pollution are as follows:

1. Let us designate some central body to carry out a uniform policy in the matter whether the question at the moment is Federal, interstate or intrastate.

2. Let us acknowledge that the problem is a serious one to the country as a whole and that certain population centers do need relief.

3. Let us recognize that much of the difficulty is that those who seek

WESLEY S. HARRIS
Chairman of the Monday morning session

legislation do not understand our problem, and also that it is not understood by many of our own mining people. Let us start by educating our own people.

4. Let us portray, from a central body, our recently added costs due to our short work week, our social security load, and our present depressed markets, then let the public decide whether we can carry any more "planned economy" expense.

5. Let us insist that directors of Departments of Health consult us on proposed legislation affecting us.

6. Let us impress, by public declarations of facts and policy, that the problem cannot be solved suddenly by sweeping laws and regulations.

7. Let us take a position that representation on committees and commissions be not in a ratio of one industrial representative to one conservationist, but more in proportion to the stake of invested capital in the matter at hand.

8. Let us try sincerely to cooperate with the advocates of pollution abatement to such an extent that we can break down the present feeling that to coal men "to cooperate" means to seek a way "to procrastinate."

9. Let us insist, with adequate proof, that the whole subject must have more facts and study.

10. Let us take a definite stand against the present policy of cities that need sewage elimination incorporating industrial wastes in their legislation obviously to gain political support from intrastate sportsmen and their legislators.

Session Chairmen

The clock-like precision with which the session programs were conducted was due in no small measure to the efficient manner in which the chairmen of the eight sessions presided. Furthermore, they aided very materially in drawing forth a wealth of pertinent discussion.

Distinguished mining men who thus contributed their services comprised:

Wesley S. Harris, president, Bicknell Coal Co.; C. S. Blair, vice president, Black Diamond Coal Mining Co.; D. H. Pape, president, Sheridan-Wyoming Coal Co.; Thos. G. Fear, general manager, Elk Horn Coal Corp.; A. J. Ruffini, superintendent, The Wheeling Township Coal Mining Co.; Newell G. Alford, consulting engineer, Eavenson, Alford & Auchmuty; William J. Jenkins, president, Consolidated Coal Co., and Chas. W. Connor, superintendent of mines, American Rolling Mill Co.

Coal Division Dinner

On Wednesday evening, April 26, the American Mining Congress gave a dinner to the members of the Coal Division at which 42 were present, including members of the Advisory Council of the Board of Governors and of the various project committees. The purpose of the meeting was to have a brief discussion of the present status of the committee studies, and to receive the recommendations of the Advisory Council as to further activities.

In the absence of R. L. Ireland, Jr., chairman of the Coal Division, E. R. Price, manager of coal mines of the Inland Steel Company, and a member of the Division's Advisory Council, presided as toastmaster.

Mr. Price complimented the work of the committees and stressed the value of these studies to the coal industry. Frank E. Mueller, newly elected chairman of the Manufacturers Division, expressed a similar view and pledged the continued cooperation of the manufacturers in promoting this work. Julian D. Conover, secretary of the American Mining Congress, presented for consideration by the Division a proposal to organize a Committee on Stream Pollution, to gather factual data on this subject, on which favorable action was taken. G. B. Southward, mechanization engineer of the Mining Congress, gave a brief resume of the progress made by the various committees since the annual conference last December, and this was followed by a general discussion. A complete account of this meeting appears on pages 48-50 of this issue.

Board of Directors Meeting

Many coal executives joined the Board of Directors of the American Mining Congress at the Board Luncheon Meeting on Thursday, April 27. Also included in the group were representatives of the Manufacturers Division which plays so important a part in the convention and exposition.

The meeting was called to order by President Howard I. Young of St. Louis, and received the reports of Erle V. Daveler, chairman of the Finance Committee; Henry B. Fernald, chairman of the Tax Committee; Herbert Wilson Smith, chairman of the Social Security Committee, and Samuel H. Dolbear, chairman of the Committee for Cooperation with the Securities and Exchange Commission. Secretary Conover presented a summary of the legislative situation in Washington prefaced by an account of the general economic and political status.

Mr. Donald A. Callahan of Wallace, Idaho, vice president of the Mining

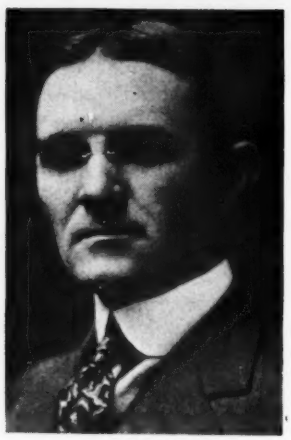
Luncheon meeting of the Board of Directors

Annual banquet

Congress, who is now in Washington as counsel assisting in preparation for the appearances of mining men before the Senate Education and Labor Committee on amendments to the National Labor Relations Act, gave the meeting a full description of this important work. Mr. Callahan spoke particularly of the necessity for mining witnesses to come forward from all parts of the United States and tell the full story of their experiences under the Wagner Act and of their experiences with the Labor Board. He said: "This is the first time and perhaps the only time for a long time that an opportunity exists to tell the Committees of Congress the true state of affairs and to call to their attention the error made in the enactment of the Wagner Act." He said that the members of the Labor Committees as well as the members of both Houses must be brought to realize their responsibility in having placed upon the statute books an unworkable law and in having placed undue powers which have been subject to maladministration by the National Labor Relations Board. It was further brought out in discussion that the prolonging of the present coal strike is due to the position taken by labor leaders under the administration of the Wagner Act.

Entertainment

Guests were royally entertained each night of the convention at special functions arranged by the Entertainment Committee under the capable leadership of L. F. Crouse, Monroe Coal Mining Company, and W. D. Turnbull, Westinghouse Electric & Manufacturing Company.



J. D. FRANCIS
President, Island Creek Coal Co.
Mr. Francis presided as toastmaster at the banquet

Monday night saw the Pavillon Caprice of the Netherland Plaza transformed into a circus setting, with a fast moving show of headline acts performing. Tuesday night's party was a stag affair in the Roof Garden of the Gibson Hotel, featuring a "Monte Carlo" session and a floor show headed by Herman Pirchner's Alpine Village Troupe from Cleveland. Wednesday night's program consisted of rural comedy and fun in the Pavillon Caprice with the WLW Boone County Jamboree.

Climax of the week's festivities was the Annual Banquet on Thursday night in the Hall of Mirrors. Following a delicious dinner Toastmaster James D. Francis, president of Island Creek Coal Co., first introduced Mayor James G. Stewart of Cincinnati, who gave a rousing welcoming talk that was received most enthusiastically. Congressman A. J. May, of Kentucky, then addressed the large gathering on outstanding problems faced by the mining industry at present, saying in part:

"Coal mining is a large employer of labor in the field of production, transportation, and distribution, while its competitors — hydro-electricity, natural gas, and fuel oil—are in comparison practically laborless.

"Natural gas, with the aid of government loans and subsidies, is being transported by pipe lines from rich Southwestern deposits to the marketing area of bituminous coal in the Middle and Northwest."

Decrying this competition and the competition of fuel oil from foreign countries, he declared:

"When South American or Mexican oil, produced from artesian wells

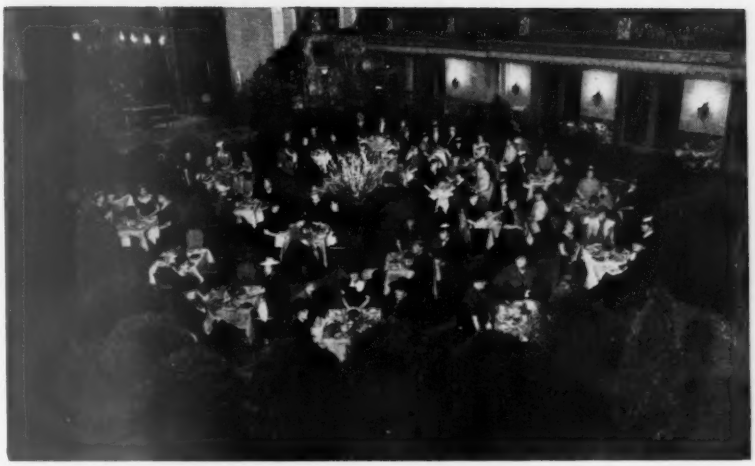
HON. A. J. MAY
Congressman from Kentucky

flowing millions of barrels without even the cost of pumping, and on pauper wage levels, flows into tanks at seaboard and is then carried by cheap subsidized water transports and dumped on the American Atlantic seaboard trade in competition with coal, it becomes an economic crime."

The Congressman flayed the Norris Dam project constructed by the Tennessee Valley Authority at a cost of $38,000,000. Completed, he said, it employs in its operation less than 20 men.

"The same amount of money invested in '38 $1,000,000 coal plants would employ regularly, over a long period of years, approximately 20,000 men, which would mean an ever-revolving fund of millions of dollars every year in the form of wages and other expenses incident to the operation of a producing private industry," he estimated.

Distinguished mining men at the head table then introduced included: Howard I. Young, president, American Zinc, Lead & Smelting Company, and president, American Mining Congress; William J. Jenkins, president, Consolidated Coal Company, member, Board of Directors, American Mining Congress, and national chairman of the Program Committee; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Company, and member Advisory Council, Coal Division, American Mining Congress; Senator C. W. Watson, president, Elk Horn Coal Corporation; R. E. Howe, president, Appalachian Coals, Inc.; T. J. Thomas, president, Valier Coal Company, and member Advisory Council of the Coal Division, American Mining Congress; Irvin Davis, president, Hatfield Campbell Creek Coal Company; Roy L. Cox, vice president, Jeffrey Manufacturing Company, and outgoing chairman, Manufacturers Division, American Mining Congress; Frank E. Mueller, vice president, Roberts & Schaefer Company, and incoming chairman, Manufacturers Division, American Mining Congress; Donald A. Callahan, Wallace, Idaho, vice president, American Mining Congress; D. H. Pape, president, Sheridan-Wyoming Coal Company; B. H. Schull, vice president, Binkley Coal Company; Colonel C. R. Moriarity, president, Cabin Creek Division of the Truax-Traer Coal Company; E. R. Price, manager of coal mines, Inland Steel Company; and John T. Sydnor, vice president and general manager, West Virginia Coal & Coke Company.



Ladies' bridge luncheon in the Hall of Mirrors

This was followed by an excellent floor show, featured by a 20-minute performance by Jane Pickens, popular radio and stage songstress, whose beautiful appearance, charming personality and lovely voice brought on round after round of applause and encore numbers.

Entertainment programs during all four nights were ably presented by Joe Wallace as master of ceremonies. His versatility and wit were matched only by his genuine interest and hard work in the successful staging of all events.

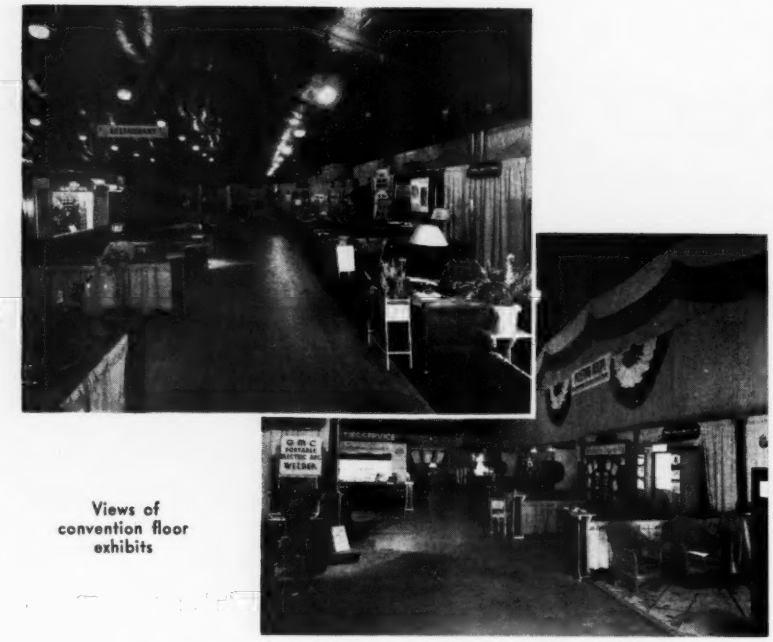
Also featured during the week were the beautiful and talented Dorothy Byton dancers, under Miss Byton's personal direction; the Singing Marines and Blanche Bradley; radium dances by Francita, and acrobatic and novelty dancing by Holly Harris.

Music on Monday and Wednesday was presented by Seger Ellis' band, and a particularly fine performance was given by Chris Christensen's orchestra at the banquet Thursday night, under the capable conducting of Harry Willsey.

Ladies Entertainment

The special program of fun for the many ladies attending the meeting began on Monday with a luncheon in the Restaurant Continentale followed by an interesting trip through the Proctor & Gamble Company plant. Sight-seeing trips in and near Cincinnati were enjoyed during the day on Tuesday, and while the men were cavorting at their stag party the ladies had a delightful dinner in the parlors of the Netherland Plaza, followed by a preview of entertainment presented at the men's affair. Sleight-of-hand tricks by jovial Matt Schulien, of Chicago, were particularly popular.

Wednesday the Hall of Mirrors was transformed into a garden of arbor



Views of convention floor exhibits

vitae, redbud and dogwood for a beautiful bridge luncheon, featuring a style show with gowns by Henry Harris, Inc. A crystal gazer and handwriting analyst were kept busy all afternoon reading character for the 70 ladies who were present.

THE EXPOSITION

The acclaim of both operators and manufacturers attests the success of the 1939 Exposition. Although the operators' registration was slightly below that of previous years due to the labor situation, exhibitors generally agreed that they had never before welcomed a more serious group of mining men.

Pre-convention publicity had urged operators to have their men get full benefit from this magnificent array of mining machinery and supplies; and reports from manufacturers in every section of the exposition halls indicated that the mining visitors did a real job of studying the exhibits. They literally went through the exposition with a fine-tooth comb—studying, considering and comparing.

The nation's leading mining manufacturers, 151 strong, presented an exposition that was a true credit to the coal mining industry. Through their fine cooperation another brilliant chapter was added to the story of modern coal.

Again, modernization and mechanical mining shared the spotlight. These themes were presented from the viewpoint of every phase of coal mine operation. One complete convention session was devoted to each of four subjects — surface preparation, conveyor mining, mechanical loading and safety—and a large portion of the exposition supplemented these phases of mining. Cutting and loading machines, underground conveyors, rubber-tired shuttle cars, mine locomotives, mine cars, drilling equipment and air compressors led an array of exhibits which ranged from these complete units to replacement parts, bearings, lubricants, blasting accessories, track tools and material, welding equipment and miscellaneous shop items.

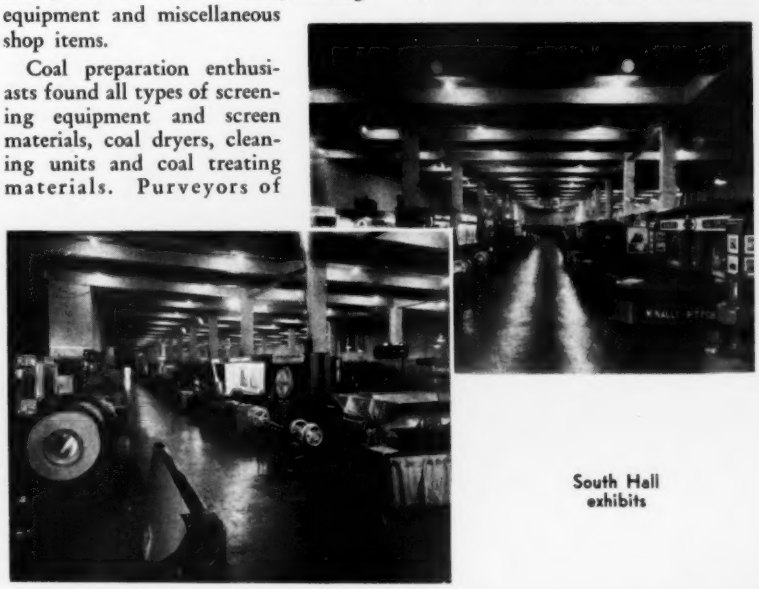
Coal preparation enthusiasts found all types of screening equipment and screen materials, coal dryers, cleaning units and coal treating materials. Purveyors of safety supplies and equipment presented a full line of the various items available for insuring the protection of workmen and the safe operation of coal mines. There was hardly anything that takes a part in coal extraction or processing that was not included in one or more of the splendid exhibits. The complete exposition offered a veritable "What's What in 1939 Mining," to the mutual benefit of both operators and manufacturers.

Plans for the 1940 Coal Convention and Exposition are already under way and a definite announcement of time and place will no doubt be made shortly. As the tempo of coal mining rises, the industry looks forward with increasing interest to its future annual meetings. The farewell at Cincinnati is always "We'll be seeing you next year!"

Through the courtesy of the General Electric Company, the Exposition was again capably handled by L. W. Shugg, serving as Director of Exhibits.

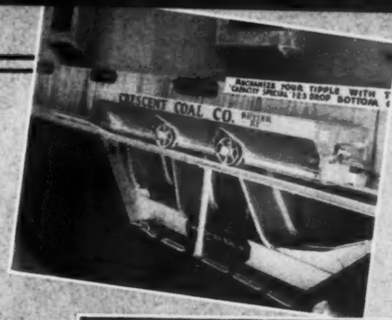
The annual meeting of the Manufacturers Division of the American Mining Congress was held on Monday, April 24. Frank E. Mueller, Roberts & Schaefer Company, was elected to serve as chairman of the Board of Governors for the coming year, succeeding Roy L. Cox, Jeffrey Manufacturing Company. Other officers elected were as follows: A. S. Knoizen, Joy Manufacturing Company, first vice chairman; E. J. Burnell, Link-Belt Company, second vice chairman; E. F. Carley, E. I. du Pont de Nemours & Co., Inc., third vice chairman.

John W. Haddock, Sullivan Machin-



South Hall exhibits


LINK BELT

Westinghouse

CRESCENT COAL CO.

CARDOX
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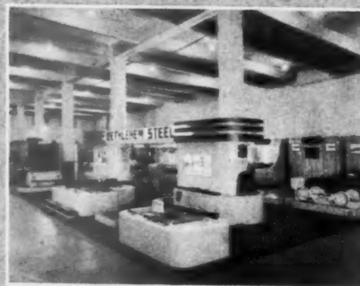
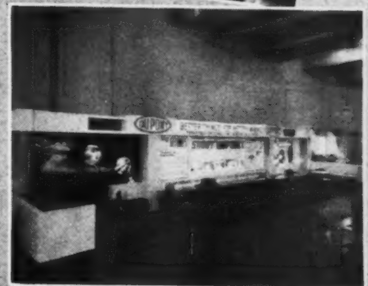

BETHLEHEM STEEL


BRASS

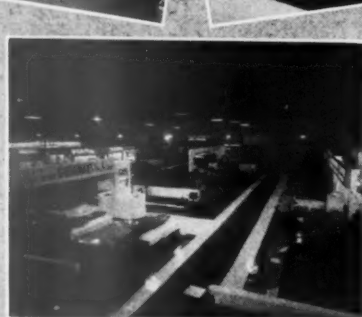
PREFORMED

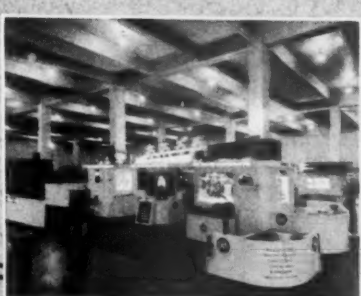
TAPERED ROLLER BEARINGS

WOOD PRESERVING

ATLAS


RESEARCH





ery Company; George E. Stringfellow, Thomas A. Edison, Inc.; J. C. Wilson, Ohio Brass Company; Frank E. Mueller, Roberts & Schaefer Company; and Charles C. Whaley, Myers-Whaley Company, were elected to fill vacancies on the Board of Governors. Other members of the Board are as follows: E. J. Burnell, Link-Belt Company; E. F. Carley, E. I. du Pont de Nemours & Co.; Roy L. Cox, Jeffrey Manufacturing Company; H. G. Marsh, Carnegie-Illinois Steel Corp.; P. H. Grunnagle, Westinghouse Electric & Manufacturing Co.; John T. Ryan, Mine Safety Appliances Co.; L. W. Shugg, General Electric Co.; V. J. Nolan, National Carbon Co.; and Arthur S. Knoizen, Joy Manufacturing Co.

FRANK E. MUELLER
Vice President, Roberts & Schaefer Co.
Newly elected chairman of the Manufacturers Division

Views of exhibits in North Hall

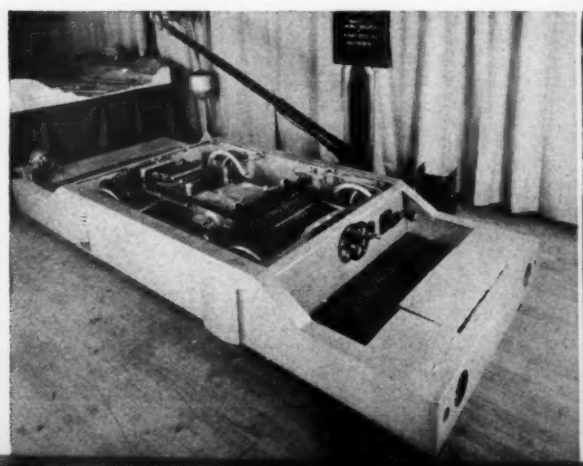
U. S. Rubber prize contest award goes to representative of Robins Conveying Belt Co.

Miners' Exhibit

One of the most interesting displays at Music Hall was the Miner's Exhibit on the convention floor, at which were shown numerous ingenious and useful devices invented by employes of coal companies. This was a new feature, inaugurated this year to give recognition to the men who had contributed improvements to coal mining and to bring these things to the attention of the entire industry.

Approximately 50 displays were entered, including a wide variety of devices, and a more complete description of these displays is given on page 52 of this issue.

Prizes of ten dollars each were awarded to 12 devices which were selected by a judging committee as being those having the widest application and simplest design. The interest aroused by this exhibit was such that it will be made a regular feature at future annual coal conventions of the American Mining Congress.



Coordination of State and Federal Aid to Mining

(*Continued from page 27*)

Colorado Cooperative Geological and Topographical survey, using United States Survey personnel in a fifty-fifty financial arrangement has, since 1922, spent approximately $300,000, of which one-half has been the contribution of state agencies. The underlying purpose of the survey is to expedite the completion of the geology and topography of the state. Starting in 1922, just following the low ebb of Colorado mining, the survey has existed on an average yearly contribution of $10,000. The appropriation for the current biennium made by the State Legislature was $25,000. The survey and cost of work surpasses that done in Canada. No other state has such modern geologic knowledge.

Mine Roads by Forest Service

In citing a few examples of State and Federal coordination, the work of the Forest Service should not be overlooked. Out of an expense of $280,-292,600 approximately $15,000,000, or nearly 6 percent, was spent on roads valuable to mining; that is, on roads that lead into or through mineralized areas. This percentage applies to the whole United States and not to individual forests on which, in many cases, 50 to 90 percent of the roads are valuable to mining. Of the total spent, approximately $29,000,000 were spent in the eastern United States where minerals do not occur; and approximately $27,000,000 was cooperation. Some cooperation was secured from mining interests, but by far the greater amount was secured from states and counties. Movements have started in numerous sections of the West to enlarge this program, and to encourage the building of roads to mines.

The government disclosed recently that it intended to spend nearly $500,-000,000 during the next 10 years perfecting a system of highways, truck roads, and trails in the national forests of the country. These illustrations show that it is *possible* for the State and Federal Governments to coordinate their efforts in aid of the mining industry. How far should this aid be extended?

Types of Federal Aid for Mining and Justification

In a recent report forwarded to Washington by certain governmental officials the following recommendations were included:

"That it was entirely feasible to use government funds in the devolpment of mines in the West; that this could be done in the following ways:

"(1) By allocating money to the United States Geological Survey for supervision of general geological and geophysical work, and actual prospecting for mineral values.

"(2) By assisting in exploration work, drilling, trenching, testing and making preliminary openings. This would include tunnels for drainage, as well as tunnels for exploration. This work should be done in known mineralized areas which have favorable geological reports.

"(3) By blocking out on public and private land ore encountered in the second or exploration stage.

"(4) By erecting concentrating mills to treat the various kinds and amounts of ore which have been found and blocked out during the entire development stage."

The recommendation contains the following conclusion:

"There are the best reasons why the government should make advances of money for general development of mining districts, and also of loans to private mining concerns. To drain a potential mineral area will put much private capital and large numbers of unemployed men to work. These men will work long after a drainage tunnel is completed. It is certainly as good an investment to take water away from proven mineral land as it is to put water for irrigation upon promising agricultural land. The returns from mining properties intelligently developed are just as certain, and oftimes more certain than the returns from agriculture and manufacturing."

Many other plans have been suggested—some coming from the industry itself and some from those outside the industry not familiar with the industry's needs, and perhaps if adopted would be more harmful than helpful. In the first classification we find the Fairchild plan coming from the State of Arizona. This plan suggests that the Federal Government form a holding company to acquire large stores of the various raw metals that enter into the manufacture of munitions of war, but that definite provision be made against disposal of such stores for a period of, say, 500 years, except as to their being subject to be drawn upon by the Federal Government in time of war. The intention would be to impound these metals in such a manner that they would not be a threat to the market at any time.

Gold Creek, Colo., Raymond Mine and Mill—Carters Lake in foreground

Mining's Independence Should Be Preserved

In my opinion any extension of State-Federal aid to mining should be such as to preserve the independence of the industry from governmental coercion, and to allow its leaders full scope for the origin of new enterprises and the better development of older ones, according to their best individual and collective judgment.

I am apprehensive of too great governmental interference for I believe that practical aims, practical prosperity, and practical service to the economy of the country are best accomplished by mining when it is left comparatively free. I also believe that an extension of State and Federal aid to mining is not only desirable from the standpoint of the industry but from the standpoint of strengthening the national economy, and accomplishing in a practical way that better life to which our governments are ideally dedicated.

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

A DINNER meeting of the Coal Division of the American Mining Congress was held at the Netherland Plaza Hotel, Cincinnati, Ohio, on the evening of Wednesday, April 26, in conjunction with the 16th Annual Coal Convention and Exposition. The purpose was to bring the various committees together for a brief discussion, with the Advisory Counsel, of the present activities and to consider any further projects. In the absence of R. L. Ireland, Jr., president of the Hanna Coal Company and chairman of the Coal Division; E. R. Price, manager of coal mines of the Inland Steel Company of Wheelwright, Ky., presided as toastmaster.

Coal Division Dinner

Mr. Price made an opening address complimenting the work of the committees and stated:

"The various committees of the Coal Division have done a splendid job and I want the chairmen and the members of these committees to know that the coal industry is greatly indebted to them for what they are doing. You have seen the preliminary and completed reports that have already been published in the MINING CONGRESS JOURNAL, and I am sure we will all agree that these contain the type of information that the coal industry can use to advantage in its operating problems.

"If any of the chairmen or members of these committees have any suggestions as to what the Advisory Council of the Coal Division can do to help them, please tell us as we want you to know that the Mining Congress stands behind you and is ready to give all possible assistance in this work."

Julian D. Conover, secretary of the American Mining Congress, submitted to the meeting a suggestion that had been made from a number of members, that the Coal Division organize a Committee on Stream Pollution, to gather factual data on this subject. This matter had previously been discussed at some length at one of the convention sessions, and in submitting the suggestion Mr. Conover stated:

"It is very evident that the matter is one which is of great concern to the mining industry. We are being put on the spot from the standpoint of legislation, both national and state, as a result of the necessity of depositing certain of our waste materials in the natural waterways of this country.

"Thus, we open up a coal mine and, in order to protect the men who are working there, we have to force large quantities of air through the mine. Water is seeping down through the mine and the combination of the water and the air causes oxidation of the sulphur in the coals, forming sulfuric acid which gets into the streams, and for which the coal industry is blamed.

"We have to form that acid if we are going to have the mines properly ventilated and drained. We don't know what the answer is, but we know that we don't want mandatory legislation which would prohibit the deposit of any so-called polluting materials, such as come from our mines, into the streams.

"We know that a lot has been done in the sealing up of abandoned mines. We know that neutralizing the acid with lime has been tried in some places and they have a tremendous amount of sludge as a result. There doesn't seem to be any practical way of treating it.

"Some of those who are advocating drastic stream pollution legislation suggest that there are valuable by-products that could be obtained from acid water. It might be so, but we certainly have a lot to find out if that is the case.

"This is a subject on which, as Mr. Woomer pointed out in the convention, we should have all possible information available, because the trend is definitely toward putting obstacles in the way of our normal processes of mine operation at this time.

"A number of our members have suggested that it would be a good thing to have another committee formed in our Coal Division, a Committee on Stream Pollution, which could study this subject; could get together the facts that are available; could find out what else we ought to know; and could put the machinery in motion to get that further information.

"We are going to need all the data we can have in meeting some of these attacks that come from our national and state legislative bodies. We have to be prepared to state on the basis of very definite information just what can and can not be done.

"If a committee could perform this work, I am sure it would be of great help to the industry. I think it would be well worth while, if you see fit,

to give us instructions to go ahead and organize such a committee.

"The current trend in legislation in Washington is on two lines. One is a survey and planning type of bill which most of the industrial organizations interested in the matter have favored. We have explained to the committees of Congress that industries are ready to cooperate and have cooperated with government agencies in trying to handle these problems.

"The other type of bill, of course, is the type that makes it possible for a bureaucratic agency to say simply, 'You shall not' put such-and-such material in the streams, and to shut down the whole industry, regardless of the effect on thousands of employes and regardless of whether any really material damage is being done. To that we are very much opposed.

"I should think our action at this time should be the appointment of a committee to study the stream pollution problem from a factual basis. The results of this study will be of real help in resisting any drastic or impractical form of regulation that may be proposed, and in cooperating with various governmental bodies in minimizing whatever stream pollution problems now exist."

Mr. Conover's remarks were followed by considerable discussion, and it was agreed that the meeting recommend to the Advisory Council the creation of a committee to investigate this subject. The investigation should bring out whether or not there are actual harmful effects to the streams from mine drainage and whether any methods can be successfully used in neutralizing mine water or extracting from it any minerals or acids that it might contain.

G. B. Southward, mechanization engineer of the American Mining Congress, gave the following brief resume of the progress that the committees had made since the Annual Coal Conference which was held in December, 1938:

The reports of the Haulage Road Committee, which is under the chairmanship of R. V. Clay of the Hanna Coal Company of Ohio, have just been published in a 90-page booklet which is now available for distribution. Quite a number of coal companies are ordering copies of this booklet for the use of their engineers, superintendents and sub-officials.

The reports of the Mechanical Loading Committee, which is under the chairmanship of Newell G. Alford, consulting engineer, have been published in the MINING CONGRESS JOURNAL. These reports recommend a standard time study form and a standard daily performance record sheet for mobile loading machines. Reprints of both of these forms have been made and distributed to all members of the Division.

The report of the Conveyor Mining Committee, which is under the chairmanship of T. F. McCarthy of the Clearfield Bituminous Coal Corporation, submits a recommended form for keeping daily performance records on single and multiple conveyor units. This has been published in the MINING CONGRESS JOURNAL and has also been reprinted and distributed to our members.

The Safety Committee, under the chairmanship of J. J. Sellers of the Virginia Iron, Coal & Coke Company, has revised the set of standard safety rules which were submitted to the Coal Division conference in December. This revision is now in the hands of the committee for their further study, and the approved draft is expected to be ready for publication and distribution in the very near future.

The Committee on Surface Preparation, under the chairmanship of T. W. Guy, consulting engineer, is reviewing a report by G. R. Delamater of the W. S. Tyler Company, which explains in some detail the problems that effect the efficiency of a screen performance. This report is now in the hands of the committee for their final review and should soon be ready for publication and distribution.

The Committee on Power through several subcommittees has made excellent progress on various phases of power uses in coal mining. Several preliminary drafts have been submitted and others are now in process of preparation.

The Committee on Roof Action, under the chairmanship of F. G. Smith of the Sunday Creek Coal Company, has started gathering material for preparation of their report and a number of coal companies are submitting data and descriptions of their roof experiences under various conditions and different methods of mining. It is the intention of this committee to assemble these experiences into a report that may serve as a guide when departures from standard systems are made.

In conclusion Mr. Southward stated: "In preparing the committee reports, two different methods of approach are being used. One is what might be called original research, but much of our work is compiling information that has already been collected by coal companies and manufactuers. There is enough material of this nature in the industry for a complete treatise on mining and through the cooperation of our Coal Division members data of this nature is being gathered."

R. L. IRELAND, JR.
Chairman of the Coal Division

Frank E. Mueller, of the Roberts & Schaefer Company, and chairman of the Manufacturers Division, promised the committees the continued cooperation of the manufacturers and said: "The manufacturers appreciate having the opportunity of working with the coal operators on the committee studies and reports. In the development of new types of equipment and in improving existing types, a manufacturer necessarily has to take quite a few gambles, and these cooperative engineering studies participated in by both branches of the industry will be the means of getting accurate data that will be of great help to all of us."

A general discussion brought out the fact that the reports of the committees were being well received and used by the coal industry and there were numerous expressions as to the value of the work being done by the Division. The following members were in attendance:

Newell G. Alford, *Consulting Engineer.*
W. J. Borries, *Dawson-Daylight Coal Co.*
F. G. Brightman, *General Electric Co.*
S. M. Cassidy, *Weirton Coal Co.*
M. L. Coulter, *Clearfield Bituminous Coal Corp.*
W. W. Dartnell, *Consulting Engineer.*
Geo. R. Delamater, *The W. S. Tyler Co.*
C. W. Gibbs, *Harwick Coal & Coke Co.*
T. W. Guy, *Consulting Engineer.*

C. C. Hagenbuch, *Hanna Coal Co.*
J. B. Haskell, *West Virginia Rail Co.*
A. W. Hesse, *The Buckeye Coal Co.*
Shelly G. Hughes, *Differential Steel Car Co.*
H. B. Husband, *Chesapeake & Ohio Rwy. Co.*
W. G. Jens, *Harwick Coal & Coke Co.*
F. A. Jordan, *Youngstown Sheet & Tube Co.*
A. R. Joyce, *Wood Preserving Corp.*
R. E. Kirk, *Tennessee Coal, Iron & RR. Co.*
A. S. Knoizen, *Joy Mfg. Co.*
A. E. Long, *Clearfield Bituminous Coal Corp.*
A. R. Matthews, *Clover Splint Coal Co.*
T. F. McCarthy, *Clearfield Bituminous Coal Corp.*
Frank E. Mueller, *Roberts & Schaefer Co.*
Phil Ong, *Sunday Creek Coal Co.*
J. T. Parker, *Inland Steel Co.*
Robert G. Pfahler, *The Berwind-White Coal Mng. Co.*
L. N. Plein, *National Bituminous Coal Commission.*
E. R. Price, *Inland Steel Co.*
D. E. Renshaw, *Westinghouse Elec. & Mfg. Co.*
J. J. Sellers, *Virginia Iron, Coal & Coke Co.*
E. A. Siemon, *Hillman Coal & Coke Corp.*
Frank G. Smith, *Sunday Creek Coal Co.*
H. C. Stelling, *National Carbon Co.*
F. L. Stone, *General Electric Co.*
T. J. Thomas, *Valier Coal Co.*
Chas. C. Whaley, *Myers-Whaley Co.*
J. C. Wilson, *Ohio Brass Co.*
Julian D. Conover, *Secretary, American Mining Congress.*
G. B. Southward, *American Mining Congress.*
P. D. McMurrer, *American Mining Congress.*

RECOMMENDED SAFETY RULES

● *As Tentatively Prepared by the Committee on Safety* *

THE Committee on Safety has recently completed a tentative draft of suggestions and recommendations for detailed safety rules. This draft has now been presented to the committee for their consideration and is composed of the following general rules which are herewith submitted and special rules for various classes of occupations as shown in the following list.

1. General Rules.
2. Special Rules for Miners and Loaders.
3. Special Rules for Handling Explosives, Blasting and Carrying Explosives into Mines.
4. Special Timbering Rules.
5. Special Rules for Wiremen.
6. Special Rules for Pumpmen.
7. Special Rules for Track Layers.
8. Special Rules for Trappers.
9. Special Rules for Haulage Men.
10. Special Rules for Man-Trip.
11. Special Rules for Mining Machine Runners and Helpers.
12. Special Rules for Mechanical Loading Machine Crews.
13. Special Rules for Drillers.
14. Special Rules for Conveyor Loaders.
15. Special Rules for Outside Employes, Shopmen, etc.

* J. J. Sellers, Vice Pres., Va. Iron, Coal & Coke Co., Chairman.

General Rules

1. Every employe should be required to inform himself as to his duties under the Mining Laws of the State and the rules of the company and strictly observe and obey the instructions contained therein. Every employe should be required to give immediate notice to the Mine Foreman or an Assistant Mine Foreman of any violations of the Mining Law of the State or rules of the company that may come to his notice. All mine officials and employes should be required to cooperate with each other and with the State Mine Inspector in enforcing the law.

2. Every new mine employe should be furnished a copy of the rules of the company, and such rules should be posted at the mines, and all such employes should be required to familiarize themselves therewith. Each employe should be required to know and obey all the special rules covering his work as well as the General Rules. If in doubt as to the meaning of any rules, an employe should apply to one of the mine officials for explanation.

3. All employes should be required to notify a mine official of any unsafe condition that may be observed by them in any working place, haulage road, or traveling way; or any damage to doors, brattices, overcasts, or stoppings, or any defect in or insufficiency of ventilation, or any falls in air-ways, as soon as possible after such conditions become known to them.

4. An inexperienced person should be required to work with an experienced person until his foreman is satisfied that he is familiar with the dangers of his work, and knows the proper and safe manner in which to perform his assigned duties.

5. Every employe should be required to make himself familiar with the meaning of all signs and signals, and especially the danger signs prepared and used by the Mine Foreman, Assistant Mine Foreman and Fire Bosses, and obey same. No person should be permitted to enter any place where a danger sign or signal is displayed unless specifically authorized.

6. No person should be permitted to take into or about the mines intoxicating liquors, or mixtures thereof, nor should any one be or be permitted to become intoxicated in or about the mines.

7. No person should be permitted to have on or about his person while within or about the mines, dangerous or deadly weapons of any kind.

8. Each employe should be required to check in and out of the mine in accordance with the practice established at the mine.

9. All employes should be warned not to touch electric wires or tamper with electrical equipment. Only persons whose duty it is to operate and care for electric wiring and equipment should have authority to touch it.

10. Any person removing any guard or safety device from any mechanical and electrical equipment for any reason should be required to see that such guard or safety device is replaced be-

fore the machine is put in operation, and if, for any cause, the guard or safety device cannot be replaced immediately, a warning sign should be put on the machine.

11. Machinery should not be repaired while in operation.

12. All employes, upon entering the mine, should be required to go directly to their working places and remain therein, except where conditions make it necessary for them to leave; and no person whose duties do not require same should be permitted to travel about the mine, buildings, or machinery, or go into an abandoned part of the mine without permission from the mine foreman.

13. Every employe whose duties require him to work with any tool, appliance or equipment of any kind should be required to report any defects therein to his foreman.

14. Any employe injured in or about the mines should be required promptly, or upon completion of the shift on which injury is received, to report such injury, no matter how slight, to his foreman and/or other designated official.

15. Wrestling, throwing material, or "horseplay" of any kind should be positively prohibited.

16. All mine cars left standing should be required to be securely blocked as described under Rule 5 of Special Rules for Miners and Loaders.

17. All inside employes assigned to a location for work should be required to examine the roof before starting work and at frequent intervals thereafter, as described under Rule 7, Special Rules for Miners and Loaders.

18. Goggles (corrective features where necessary) or other eye protection should be required to be worn when working with or adjacent to tools, equipment or materials from which particles may fly.

19. All underground men, and certain outside men, should be required to wear safety hats and hard toed footwear, and should not be permitted to wear loose fitting clothing.

20. All persons should be forbidden to ride on mine cars and locomotives except motormen and brakemen assigned to operate them and only such others who may be authorized to do so by the Mine Foreman.

21. No spikes, nails, files or tools should be permitted to be driven in props in such manner as to cause injury to passing persons.

22. Every employe should be required to take great care when on haulage roads to avoid injury from moving trips or electric wires. Employes should not be permitted to pass around or through standing trips without first satisfying themselves that the trip will not move while they are so doing. Augers or other tools or implements should not be carried on the shoulder or in positions where they may come in contact with electric wires.

23. Every employe, unless duly authorized, should be forbidden to meddle or tamper in any manner, with the cars, tracks, machinery and fixtures, including electric signals, switches, and signal wires, in and about the mines; nor should he throw, deposit or leave coal or dirt, slate and other refuse or material on roads or ditches, so as to interfere with the running of trips, or other operations of the mine.

24. Tools of inside mine workers that are not being used by them should be placed in an orderly manner along the rib. After finishing work, all day men should be required to put their tools in the place provided therefor. All refuse, scrap iron, and other salvaged material should be deposited in the proper place, and all working places should be kept clean.

25. Fire hazards should be required to be guarded against and reported. No ties, wood, old boards, posts or inflammable material should be allowed to accumulate in the mines.

26. If gas or coal should be ignited by blast or otherwise, same should be required to be promptly extinguished if possible. If an employe is unable to extinguish any fire, he should be required to promptly report it to the Mine Foreman or one of the Assistant Foremen.

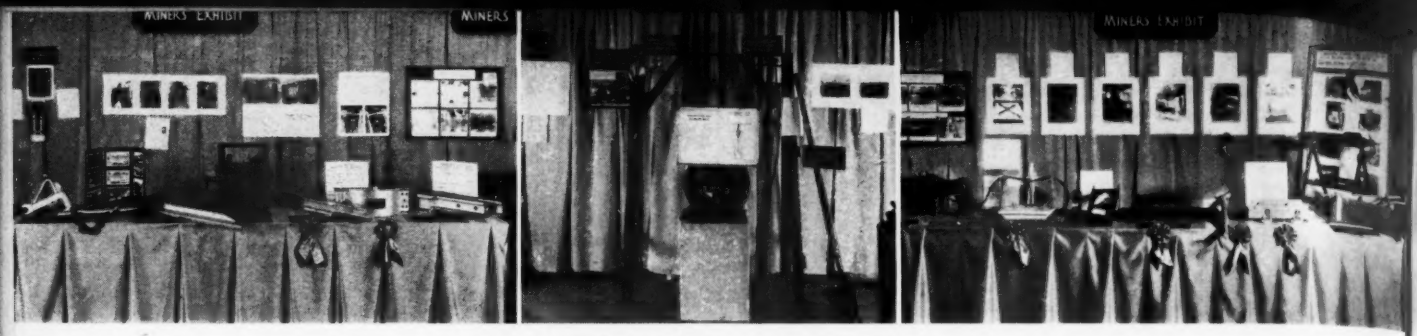
27. Employes should not be permitted to tamper with fire fighting equipment located inside or outside the mine, and they should be requested to report any defects therein or removal thereof.

28. No miner, workman, or other person should be permitted to carry into a mine where a "no smoking" rule has been established, any matches, pipes, cigars, cigarettes, or any device for making lights or fire not specifically authorized by the mine management or State Mine Inspector.

29. Employes should be required to keep ventilation doors in the mine closed at all times whether the mine is operating or not.

30. No employe should be permitted to couple or uncouple cars except designated motormen and brakemen, unless instructed to do so by the foreman.

31. The mine rules should in no way supersede or take the place of the State Mine Law but should be merely supplementary thereto, and in case of any apparent conflict between them the State Mine Law should govern.



Views of the Miners Exhibit at recent Coal Exposition

THE MINERS EXHIBIT

IT TAKES a lot of ingenuity to operate a coal mine, and the manufacturers are using all the brains and money they can command, to design and make machines and equipment for all the operations that are necessary to keep a mine running. But this is not enough, because there are so many special conditions and contingencies that many things in addition to regular and standard equipment are needed. The engineers of the coal companies have done their share in devising improvements, short-cuts and special designs, but to the rank and file of the men at the mines should go the credit for contributing hundreds and probably thousands of useful ideas and devices that have made coal mining easier, safer and more efficient.

The first important thing about an invention or device is the idea itself, but it goes without saying that an idea is not worth anything, until it is made to work. Sometimes this is a simple matter but in any case the manner in which an idea is crystallized into workable form is where the real ingenuity lies, and it has been both in originating ideas and in making them work that the men at the mines have contributed so greatly to the improvement of coal mining.

Most of these useful inventions come about through a realization that in a certain operation something is lacking that would make the operation easier to perform. This may occur in several ways: (1) through the repetition of failures, accidents, breakdowns or delays, i. e., *the same thing frequently happening to cause interruptions;* (2) through obvious inefficiency of a performance, i. e. *something awkward, irritating, back-breaking or taking too much time to do;* and (3) through an engineering study or an operating analysis, i. e. *a planned investigation to see whether lost motion or unproductive work exists.*

The latter of these three methods is used mainly by engineers of the operating companies and technicians of manufacturers, but the first two methods, which are based on observation and experience, are open to everyone and it is from this source that so many good ideas have come. For the most part these ideas and devices have been applied to local use, and in order to bring these things to the attention of the mining industry and to give recognition to the men who have designed and invented them, the American Mining Congress this year inaugurated a MINERS EXHIBIT at the Annual Coal Convention at Cincinnati, where men were invited to bring their devices so that everyone could see them. More than 50 displays were sent in, and the interest shown was such that this exhibit will be made a regular feature at future Expositions.

The American Mining Congress awarded prizes of $10 each to the 12 exhibits which were considered to be the most ingenious, to have the widest application and to be of simplest design. The winners of these awards were selected by a judging committee consisting of W. J. Jenkins, president of the Consolidated Coal Company and Chairman of the Program Committee; Roy L. Cox, vice president of the Jeffrey Manufacturing Company and Chairman of the Manufacturers Division, and Paul Weir, consulting engineer of Chicago. Besides these prizes every exhibitor will receive a copy of the 1939 Year Book on Coal Mine Mechanization and a year's subscription to THE MINING CONGRESS JOURNAL.

Due recognition should be given to K. R. Bixby, general manager of the Midland Electric Coal Corporation of Illinois, and W. W. Dartnell, mining engineer of Claremont, N. H. Mr. Bixby was the originator of the idea, and Mr. Dartnell served as Chairman of the Miners Exhibit Committee, and these two men were largely instrumental in bringing this feature to its success.

Prize Winners

MINE CAR SAFETY STOP
Robert Dickson
West Va. Coal & Coke Corp.

PLANT MODEL
Joseph Steele
Hanna Coal Co. of Ohio

STEEL CAR STRAIGHTENER
W. T. Dalton
Gauley Mt. Coal Co.

CABLE REPAIR SLED
Louis O. Carroll
Midland Elec. Coal Corp.

BUGGY FOR TRUCK TIRES
D. Locke
Central State Collieries Inc.

LOCOMOTIVE BUMPER
J. T. Parker and H. K. Mundorff
Inland Steel Co.

ELECTRIC CABLE SAFETY HOOK
S. E. Thorne
Lehigh Navigation Coal Co.

MOTOR SUSPENSION-SAFETY BLOCKS
John R. Jones
Harwick Coal & Coke Co.

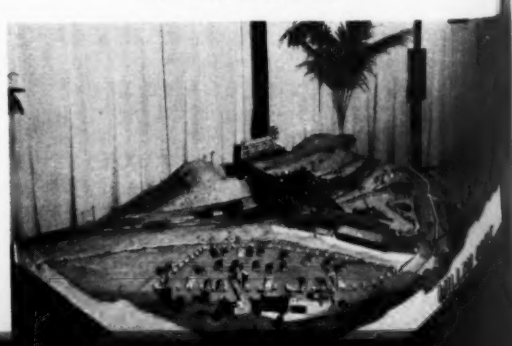
SHAFT EXTRACTOR
Ernest A. Prudent
Bell & Zoller Coal & Mng. Co.

COMPROMISE RAIL JOINT
W. F. Wright
Va. Iron, Coal & Coke Co.

FUSED TROLLEY NIP
Ezra Lane
Boone County Coal Corp.

RAIL BOND TESTER
John E. Roblee
Pittsburgh Coal Co.

Willow Grove Plant Model
Hanna Coal Co. of Ohio



Extinguishing Fire at Argonaut

(*Continued from page 25*)

south drift. It was arrested here by the water accumulated in the drift by the dam and by a deficiency of oxygen due to sealing. There was no evidence of combustion, which proved that sealing had accomplished its purpose. Large masses of fused rock were found in numerous places in the fire region. Temperatures were often above 85° and even 100°, with high humidity, which necessitated the use of Lamb air-foil injectors to provide air motion while caves were being cleaned up.

Value of Gas Analyses

As events at the Argonaut mine were followed one was impressed with the fact that the recordings made with the continuous carbon monoxide indicator and other observations and analyses furnished the most dependable data for judging what was going on in the fire zone. These showed that the fire had been controlled by the bulkheads and that it was being slowly extinguished; they indicated conditions that required immediate attention and pointed the way to safe procedure.

Under the 4350 to 3900 raise. Foreman Shea has hand on burnt timber saved by caving. More than 500 tons of waste found here—almost completely blocking ventilation

Grateful acknowledgment is made to Alex. F. Ross, superintendent, and Robert Shea, mine foreman, of the Argonaut mine; to Edw. C. Hutchinson, president, and Wm. Sinclair, superintendent, of the Kennedy mine; to Clarence Krebs, mine rescue station foreman; and to C. H. Fry, chief, Bureau of Industrial Accident Prevention, State Industrial Accident Commission, and Carl Johnson and F. L. Lowell, State mine inspectors, who did everything possible to assist in the investigations at the fire.

Wheels of Government

(*Continued from page 29*)

000,000 annually for four years for the purchase of materials designated by the Munitions Control Board as strategic. It is understood that the President desires the annual expenditure to be limited to $10,000,000 as included in the Thomas bill which passed the Senate at an earlier date. The amount of the appropriation will have to be decided by the Senate and House conferees. Both versions carry funds for field work in developing domestic sources of supply, to be carried on by the U. S. Bureau of Mines and U. S. Geological Survey.

Stream Pollution

The bill sponsored by Senator Barkley of Kentucky and similar to the vetoed Vinson bill of last year passed the Senate on May 1. Debate was prolonged, particularly over amendments offered by Senator Clark of Missouri and Senator Danaher of Connecticut. Senator Clark offered his bill, similar to that of Senator Lonergan of previous years, as an amendment. His amendment was defeated and in the debate on the amendment by Senator Danaher of Connecticut which would have introduced drastic enforcement provisions, Senator King of Utah and Senator Adams of Colorado registered strongly against Federal invasion of the powers of the State and against any coercive treatment of mining. Said Senator Adams:

"In the State of Colorado, we are interested in the devolpment of our mineral resources. We go into the upper reaches of streams, where ore is taken out and crushed, and the dross is frequently washed down in the shape of tailings. We are compelled to let it flow into our streams. I am wondering whether or not that situation comes within the Senator's amendment. The waste of such mines is unquestionably detrimental to fish. The stream is made "milky" for a time, but the sediment gradually settles, and it is not unhealthy to any extent. Our communities tolerate it because they are anxious to have the minerals developed.

"As I caught the amendment, it seems to be immediate, it seems to be mandatory; that is, that if there is a certain condition the United States District Attorney must move in. There may be a mine which is 20, 30 or 50 miles really from a habitation some of the tailings of which would be washed into a stream. Under these conditions, I am wondering if, under the Senator's amendment, the United States Attorney would be compelled to go in immediately and stop the mining process which is the cause of the stream pollution?"

The House Committee on Rivers and Harbors is expected to report a bill quite similar to the Barkley bill passed by the Senate, but containing some additional administrative provisions which are understood to be desired by the Bureau of Public Health. The form of this bill is not objectionable at this time to industry and it is believed that it may be substituted for the Barkley bill and passed by the House.

Bituminous Coal

With over a month's idleness of the bituminous mines in the Eastern and Southern areas failing to bring about a new Appalachian wage and working agreement, the strike order of May 5 went into effect stopping production in the mines of Indiana, Illinois and the West. It is possible that in order to force the signing of a contract, the United Mine Workers of America may also cause the anthracite mines of Pennsylvania to suspend operations.

The National Bituminous Coal Commission has not as yet announced coal prices although these are expected to come later in May. In the meantime hearings before the Committee on Ways and Means in the House on the Allen bill to amend the Guffey Act may come in the latter part of May unless a general revision of the Revenue laws delays action by the Committee.

PERSONALS

BERNARD I. MANDERFIELD has been appointed superintendent of the Champion mine of Copper Range Company at Painesdale, Mich. Mr. Manderfield, a graduate of the Michigan College of Mining and Technology, was employed at the Baltic mine for 11 years prior to the closing of that property, at which time he was transferred to the Champion as efficiency mining engineer. He held this post up until 2 years ago when he was advanced to chief engineer.

M. W. MEDILL, superintendent of Union Pacific Coal's Reliance, Wyo., operations, retired on March 1. He had been in the company service since 1899. He was succeeded at Reliance by JAMES LAW.

PAUL REDEKER has left the Copper Range Company to accept the superintendency of the Isle Royale mine. He was formerly superintendent of the Baltic mine of Copper Range Company.

W. H. WALSH, formerly deputy state coal mine inspector of Wyoming, assumed the duties of safety engineer for the Commercial Coal Companies in southwestern Wyoming on April 1.

DAVID P. GRAHAM, manager of the gas scrubber division of the Peabody Engineering Corporation of New York, sailed March 30 on the New Amsterdam for a European business trip. He will spend several weeks in England, Holland and France, returning in May.

LUCIEN EATON has announced his resignation as general manager of the Isle Royale Copper Company, to return to his consulting practice. He had charge of the unwatering and rehabilitation of the Isle Royale mine, which were concluded during the latter part of 1938, and the mine has been in production for the past six months.

MAX W. BABB, president of Allis-Chalmers Mfg. Co., was recently honored by having conferred on him the degree of Doctor of Laws by Iowa Wesleyan College at Mt. Pleasant, Iowa.

H. L. GRIFFIN, recently associated with Paul Weir, consulting engineer of Chicago, has joined Heyl & Patterson, Inc., Pittsburgh, as preparation engineer. Mr. Griffin has had wide experience both in the combustion field and in coal mine engineering, safety operations and coal preparation, having been for 10 years chief engineer

of the New England Fuel and Transportation Company and division engineer for its successor, The Koppers Coal Company, in northern West Virginia. For a number of years he served on the preparation committee of the American Mining Congress.

L. EBERSOLE GAINES has been elected president of the New River Company to succeed ROBERT H. GROSS, who resigned recently with the understanding that a successor be chosen at the earliest possible date.

D. M. KELLY, vice president of Anaconda Copper Mining Company, was a visitor in March at the International Smelting and Refining Company's offices in Salt Lake City.

JAMES D. FRANCIS, president of the Island Creek Coal Company, was one of the principal speakers at a special round-table session on the future for power and fuel at the 27th annual meeting of the Chamber of Commerce of the United States held the first week in May. His subject was "The Coal Industry in Tomorrow's Business."

CHARLES A. HIGGINS was elected president of the Hercules Powder Company at the organization meeting March 22 of the board of directors. He succeeds R. H. DUNHAM, who continues with the company as chairman of the board of directors, the position he has held jointly with the presidency since the organization of Hercules Powder in 1912—a period of 26 years.

J. LOUIS REIBER, formerly vice president of Mt. Olive and Staunton Coal Company, has been made president of that company. He is succeeded by JOHN S. FORMAN, who was promoted to vice president and general manager in charge of operation of the properties of the company, with mine at Staunton, Ill.

DR. JOHN W. FINCH, director of the Bureau of Mines, held the silver buying policy of the Government to be an economic aid in testimony before the special Senate Silver Investigating Committee on April 8. The Bureau, Dr. Finch said, does not hesitate to state that the silver buying policy has been a tremendous aid to the nonferrous metal mining industry, and cited figures to show that there was an increase in gold and silver mining employment between 1933 and 1937 of some 36,000 workers. Had it not been for the silver program, in the opinion of Dr. Finch, the price of the white metal would be around 30 cents an ounce.

—*Obituaries*—

FRANK FARRINGTON, well known mine union leader in Illinois, died March 30 in Streator, Ill., after a heart attack. His age was 66. Mr. Farrington was president of the Illinois District of the United Mine Workers of America for 12 years until his retirement in 1926.

JOHN E. NELSON, manager of northern ore mines for the Republic Steel Corporation, died suddenly March 29 of a heart attack at the age of 60. Mr. Nelson was appointed manager of northern ore mines by the Republic in 1933, to succeed the late FRANCIS J. WEBB, and has been in the employ of the Republic Steel Corporation and its predecessor, the Republic Iron and Steel Company, for 40 years.

CHARLES B. MURRAY, president and treasurer of Crowell & Murray, Inc., chemists and mining engineers, was killed March 25 by an automobile while crossing a dimly lighted boulevard in Cleveland Heights, Ohio. He was one of the country's best informed authorities on the Lake Superior iron ore region, the firm of which he was president having sampled and analyzed many millions of tons of Lake Superior iron ore. His age was 73.

CHARLES E. ASH, vice president and secretary of the Glen Alden Coal Company, died in Kingston, Pa., March 7 of a heart attack. He was 65 years old.

NEWS and VIEWS

Goldfield Operators Resume

The Goldfield operators recently resumed development on their leasehold near Goldfield, Nev., through the Velvet shaft. The operators plan to open the Clermont vein structure, with the ultimate object of developing that section of the vein where gold values had been proven years ago by early operators of the Jumbo Jr. claim, and more recently by Goldfield operators.

It is reported that the Clermont vein has within the past two years produced over $900,000 from the adjoining Clermont claim, under operation by the Eastern Exploration Company, a subsidiary of the Calumet and Hecla Consolidated Copper Company.

In addition to working the Clermont vein, Goldfield operators plan to continue reopening the old vein which produced valuable ore when the mine was worked in 1917 by the Jumbo Extension Mining Company, and develop additional ore in this vein that would be profitable through the higher price of gold at present.

The mine work will be under direct supervision of Elmer Burt, who as mine superintendent for Eastern Exploration, had directed extraction of their ore body.

National Safety Congress Meeting

The 1939 National Safety Congress and Exposition will be held in Atlantic City, N. J., October 16-20, according to a recent announcement from the organization headquarters in Chicago. The Safety Congress is the annual meeting of members and committeemen of the National Safety Council, bringing together some 10,000 safety leaders from all parts of the world. Scheduled for this year's meeting are 130 sessions and 600 speakers.

New Custom Mill For Elk City Mine

Construction work on a new custom mill at Elk City, Nev., will soon be completed, according to a recent statement from C. H. Nethaway, general manager of the Clearwater Concentrating Company.

A wide range of flexibility in methods of feeding various types of ore has been incorporated in the plant, including cyanidation, amalgamation, gravity and flotation. Rapid changes in the process are possible, with nine distinct flow sheets that can be used and interchanged to meet different types of ore as they reach the unit.

Capacity of the plant is 65 tons daily, and storage facilities will handle 230 tons, which may be expanded to 500 tons as capacity for production is increased at the mine. Chief engineer and designer of the plant is J. E. McCloskey.

Stallings Heads Potomac Assn.

R. L. Stallings, of the George's Creek Coal Company, Inc., was elected president of the George's Creek and Upper Potomac Coal Association at the annual meeting of the organization held in Cumberland, Md., March 2. He succeeds Charles E. H. Brown, of the Mastellar Coal Company, who served as president for six years. Other officers elected were: A. B. Crichton, Manor Coal Company, vice president; William Jenkins, Koontz Coal Company, secretary-treasurer; and Miss K. H. Fritch, of Cumberland, assistant secretary-treasurer.

New Idria Resumes Operation

The New Idria mine, largest quicksilver producer in the western hemisphere, located near Hollister, Calif., has resumed normal production, with 140 men working two shifts underground and two at the furnace. Operations had previously been curtailed but never suspended during a two-month strike.

Utah Chapter of A. M. C. Elects Officers

At the Annual Meeting of the Utah Chapter, American Mining Congress, March 22, officers for the ensuing year were elected as follows:

Governor—James Ivers, vice president and general manager, Silver King Coalition Mines Co.

First Vice Governor—W. J. O'Connor, manager, American Smelting and Refining Co.

Second Vice Governor—F. S. Mulock, vice president and general manager of western operations, United States Smelting, Refining and Mining Co.

Third Vice Governor—Gloyd M. Wiles, manager, Park City Consolidated Mines Co.

Secretary—A. G. Mackenzie.

All directors of the Chapter whose terms expired at the meeting were re-elected as follows: E. A. Hamilton, James Ivers, D. MacVichie, J. A. Norden, H. E. Raddatz, J. D. Shilling, G. W. Snyder.

Other directors of the Chapter are: O. J. Egleston, J. O. Elton, Cecil Fitch, O. N. Friendly, M. G. Heitzman, Paul H. Hunt, Thomas F. Kearns, C. T. Keigley, D. D. Moffat, F. S. Mulock, W. J. O'Connor, Gloyd M. Wiles, James W. Wade.

Arizona Department of Mineral Resources Formed

An act creating the Department of Mineral Resources for the state of Arizona passed both houses of the legislature by a unanimous vote and was signed March 1 by Governor "Bob" Jones. Under an emergency clause written into the act, it went into effect immediately. Principal sponsor of the new law was the Arizona Small Mine Operators Association, and its enactment into law is a tribute to that organization.

The new department is designed for study of the economic problems of the mining industry of Arizona, particularly relating to the small mine operator. The field will cover both conditions existing wholly within the state, and the effect upon the state's mining industry of matters which are national in scope.

Members of the board of governors of the department, serving without pay except for travel expenses, are Charles F. Willis, of Phoenix; Shelton Dowell, of Douglas; Dr. N. H. Morris, of Phoenix; A. C. W. Bowen, of Winkelman, and J. Hubert Smith, of Kingman.

Hecla's New Mill Operating

The modernized mill of Hecla Mining Company at Gem, Idaho, under construction during the last half of 1938, is now treating Hecla ores exclusively by flotation. While the modernizing work was under way, Hecla ore was milled at the Star plant located near the Hecla shaft at Burke, Idaho.

The new mill has a capacity of 900 tons per day, and the alterations and additions cost more than $80,000, according to the report. It is equipped to make double separation of lead and zinc concentrates, and fine grinding of all ore will be possible. W. L. Zeigler, Hecla mill superintendent, designed the new mill and had charge of all the remodeling work.

Carbondale Coal Properties Sold By Sunday Creek

Sale of the real estate holdings and properties of the Carbondale Coal Company at Nelsonville, Ohio, which was owned and operated for three years by the Sunday Creek Coal Company, to Oral Daugherty of Nelsonville was announced March 29. In order to devote his full time to the operation of the Carbondale properties, Mr. Daugherty, who has been general superintendent of the Sunday Creek Coal Company, resigned his position April 1.

Frank G. Smith, of Nelsonville, who had been associated with Daugherty in the management of the Sunday Creek mine, has been promoted to the position of general superintendent.

The property acquired by Daugherty involved the transfer of 2,300 acres of land, 47 houses, company store and office building, mining rights, mine tipple and all equipment employed in the production of coal.

Rocky Mountain Institute Meeting

The Rocky Mountain Coal Mining Institute will hold its next meeting in Salt Lake City on June 15, 16 and 17. General chairman of the meeting will be Carl W. Sinclair, and other chairmen include Moroni Heiner, arrangements; L. R. Weber, entertainment and banquet; Joseph Parmley, finance; and D. C. Frobes, exhibits.

H. C. Marchant is president of the Institute, and Fred W. Whiteside is secretary-treasurer.

Silver Conference Held At Reno

A permanent monetary system based on gold and silver, with the price of silver stabilized at a figure higher than the present mint price of 64.64 cents per ounce, was recommended March 28 by a conference of western governors, their representatives and mining men at a meeting held at Reno, Nev., March 27 and 28.

The delegates ended their two-day meeting after participating in conferences attended by U. S. Senator P. A. McCarran of Nevada, and the governors of Arizona, Utah and Nevada. The conference was called by Governor E. P. Carville of Nevada.

Various recommendations of the group concerning silver were incorporated in one resolution, to be forwarded to the President, both branches of Congress and the governors of all the western states.

Salient points of the resolution are as follows:

"The mining of silver is important . . . because of the income from silver as a metal by itself and also as a source of income from the mining of base metals in which silver is contained.

"We are faced with a serious problem of unemployment and relief. . . . There is an actual urgent condition which prompted the calling of this conference and which prompts us now to appeal to the President and the Congress of the United States for action which will assist in meeting a grave situation.

"The present situation with regard to silver is most unsatisfactory. Those engaged in mining . . . are harassed and beset with uncertainties and constantly are deterred from making commitments for continuing operation and development and in planning for future employment.

"Accordingly, we urge upon the Congress and the President to take action immediately, fixing the price of silver for monetary purposes beyond June 30, 1939, and that this price be increased from the present basis of 64.64 cents per ounce for domestic silver. Such action upon the part of the Congress and President will insure an increase of employment, thereby taking thousands of men off our relief rolls and putting them back to work.

"Further, we urge that the present uncertain condition be remedied by the enactment of laws which will definitely and permanently reestablish silver to its rightful place in our monetary system.

"We favor a metallic base for United States currency, with the employment of both gold and silver in such base.

"We favor continued acquisition by the United States Treasury of all newly mined domestic silver tendered to it.

"We favor the purchase by the United States of foreign silver, provided the proceeds of such purchase shall be used to promote or increase the sale of agricultural and industrial products of the United States in foreign countries.

"We urge that a silver policy be established which shall not be subject to sudden frequent changes; that the price of silver shall be fixed at a point providing a reasonable return for the risk taken in mining operations and which shall act as an incentive to future development of our mineral resources. The prosperity of the mining industry of the west contributes in large measure to the prosperity of the entire nation. We believe that there can be no established prosperity, furnishing employment to our thousands of people except through a firm and definite stabilization of the price of silver."

The conference also approved a proposal by Governor Henry H. Blood of Utah urging formation of the conference into a permanent organization to press for immediate Congressional action on pending silver legislation. Governor Carville of Nevada was chosen chairman of the organization at the suggestion of Governor Blood.

Coal Research Program

Fifteen leading engineers from various sections of the bituminous coal industry, meeting in the William Penn Hotel, Pittsburgh, March 21, charted a research program that is designed to restore large tonnages of coal to the annual production of the industry. As members of the Research Committee of Bituminous Coal Research, Inc., the group decided which of the many pressing engineering problems of the industry should be attacked by research methods as soon as possible. The program was based on a proposed expenditure of $235,000 a year.

In making a selection from the many investigations that were proposed at the one-day meeting, preference was given to the projects whose completion would increase annual coal consumption by millions of tons. Numerous cases were cited at the meeting in which the coal industry could retain and regain large markets if certain technical developments in coal handling and firing equipment were perfected to a degree comparable to equipment now used with competing fuels. Although other fuel industries have forged ahead with large research and engineering programs, to the detriment of the coal business, the engineers were confident that the tide will be turned when the coal industry supports the program that they have prepared.

The six-point program of technical investigations and service outlined at the close of the meeting included the development of methods and equipment for (1) the completely automatic heating of residences and buildings with a wide range of coals, (2) ceramic and metallurgical heating and melting with pulverized coals, (3) the complete gasification of coal, (4) a coal dust engine, and (5) the collection and handling of ash without detrimental slagging, clinkering or discharge into the atmosphere. While planning experimentation on the above subjects, the committee also proposed a system of coordination of coal research throughout the country by making Bituminous Coal Research, Inc., a clearing house both for problems confronting the coal industry and for research findings that help to solve these problems.

Those present urged that the industry underwrite the program with adequate funds as soon as possible and regardless of the probable outcome of the price stabilization and wage controversies, because the proposed developments are necessary in any event if coal markets are to be retained and restored.

Participating in the program conference under the chairmanship of Howard N. Eavenson, prominent coal executive and engineer, were John C. Cosgrove, president of BCR; J. D. Doherty, Koppers Coal Company; John Fielding, Jr., Hanna Coal Company; E. R. Kaiser, Bituminous Coal Research, Inc.; E. J. Kerr, Lorain Coal & Dock Company; Otto J. Menke, Island Creek Coal Company; J. B. Morrow, Pittsburgh Coal Company; F. K. Prosser, Norfolk & Western Railway; C. A. Reed, National Coal Association; George C. Ritchie, Chesapeake & Ohio Railway; Ralph A. Sherman, Battelle Memorial Institute; R. F. Stilwell, Red Jacket Coal Company; J. E. Tobey, Appalachian Coals, Inc.; and Clyde E. Williams, Battelle Memorial Institute.

RFC Mining Loans

Mining loans made by the Reconstruction Finance Corporation from February 2, 1932, to February 2, 1939, have been summarized in the corporation's 7-year report as follows:

One hundred forty-four loans in the amount of $12,6o5,500 have been authorized to 126 borrowers for mining, milling and smelting ores and development of ore bodies. Of this, $7,392,000 has been cancelled and $4,179,700 disbursed; $1,531,252 has been repaid; 87 of these loans aggregating $1,440,500 have been approved under the section of the Act which authorizes loans up to $20,000 to one borrower for development; $716,000 of this has been withdrawn or cancelled. These development loans will entail a large percentage of loss.

Comstock Producing Steadily

Nine mills are reported to be in constant operation in the Comstock, Nev., district, with daily production estimated at over 1,000 tons. Activity is particularly brisk in the Silver City area, where veins are largely gold bearing, and operators are not seriously affected by the uncertain position of silver.

The outstanding event in the Virginia City field last year was development of massive ore bodies in new sections of the Overman property of the Consolidated Chollar, Gould and Savage Mining Company. This work not only converted a prospect into an important producer but materially extended the limits of the Comstock lode. In the closing weeks of 1938 the company added a large cyanide mill to its equipment.

Leading producers are the Consolidated Chollar, Sutro Tunnel Coalition, Sierra Nevada and South Comstock. Negotiations are proceeding for resumption of heavy production from the properties comprising the Arizona Comstock, closed last year by financial troubles.

Utah Manganese Deposits To Be Worked

It is reported that Electric Mining and Supply Company, Grand Junction, Colo., has acquired some 3,000 acres of land containing manganese deposits near Floy, Utah. Plans are under way for the erection of a 30-ton electric refining unit which may start operations within the month, power to be supplied by Utah Power and Light Company.

Patents for the refining process are held by C. S. Klingaman, president of the firm. A unit similar to the one at Thompson is being constructed at Leadville, Colo., for smelting of silver and lead ores of the Tabor mine.

The Electric Mining and Smelting Company is capitalized at $300,000. Officers are: president, C. S. Klingaman; E. E. Bennett, of Grand Junction, vice president; L. L. Patten, of Delta, Colo., secretary-treasurer; and E. P. Harrington, assistant secretary.

Operators Offer Anthracite Bill

A nine-point program giving the anthracite operators' opinion on rehabilitating the hard coal industry was included in a bill introduced in the Pennsylvania legislature early in April.

The measure, drafted by Walter Gordon Merritt of New York, counsel for Anthracite Institute, Inc., provides for price fixing, production quotas and marketing agreements, and the establishment of a Pennsylvania anthracite commission.

Expenses of the commission would be borne by a tax of 5 cents on every ton of coal sold, but the state would advance $100,000 at the start.

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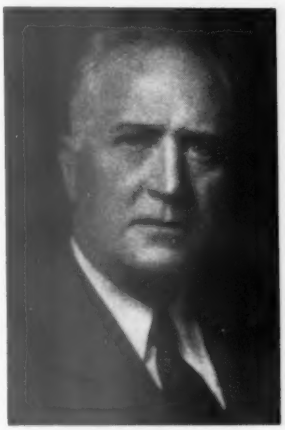
6th ANNUAL METAL MINING CONVENTION GETS UNDER WAY



DAVID D. MOFFAT

The Board of Governors of the Western Division of the American Mining Congress has unanimously elected David D. Moffat, Vice President, Utah Copper Company, Salt Lake City, Utah, its chairman for the current year. Mr. Moffat succeeds Stanly A. Easton, President of the Bunker Hill and Sullivan Mining and Concentrating Company, Kellogg, Idaho. As chairman of the Western Division, Mr. Moffat will take a leading part in laying plans for the Sixth Annual Metal Mining Convention and Exposition of the American Mining Congress which is to be held at Salt Lake City, August 28-31.

George H. Rupp, Manager of Mining Department, Colorado Fuel and Iron Corp., Pueblo, Colo., has accepted the chairmanship of the general program committee for this meeting. Under Mr. Rupp's leadership, arrangements are being made to present a program which will include discussions of the many complex problems facing the mining industry today. Features of the Convention will be addresses by noted mining leaders, industrialists, and men prominent in national affairs. Operating problems as well as the economic problems of the industry are slated for careful deliberation by executives and operating men representing fully 90 per cent of the metal mine output of the United States who are expected to attend the Convention.

GEORGE H. RUPP

A nationwide program committee is now being selected and questionnaires have been sent to mining men throughout the country calling for suggestions as to the specific topics to be presented at the meeting.

In conjunction with the Convention sessions at Salt Lake City's Minerals Building, there will be held an exposition of metal mining equipment and supplies in which over 85 nationally known manufacturers will participate. At this early date, three months in advance of the Convention, fully 65 per cent of the entire exhibit space has been contracted for. The displays of equipment will include everything needed for modern mine and mill operation.

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Federal Mining Uncovers New Vein

Stockholders of Federal Mining and Smelting Company were told by President F. H. Brownell at their annual meeting that the company has uncovered a new vein known as the Ulike ore body. This new body, which is about 13,000 feet from the Morning mine at the 2,450-foot level, gives indications of being extremely promising, according to Mr. Brownell's statement. Average width of the vein runs around 5 ft. 6 inches, with an average zinc content of 2.7 percent, lead 9.9 percent and approximately 5 ounces of silver. The latest findings show the vein to have a width of 6 ft., with 7.6 ounces of silver, 15.5 percent lead and 6.1 percent zinc.

Comment on S. E. C. Symposium

To the Editor, Mining Congress Journal:

I was greatly interested in the discussion at the Los Angeles meeting last fall of the experiences of mining people with the Securities and Exchange Commission and in the subsequent articles in the February JOURNAL reporting the entire proceedings. In his comments on the SEC Committee report, Mr. Dolbear states that, "the Commission has adopted rules by which it defines the words 'positive, proven, blocked out, probable, and possible' as applied to ore," and then goes on to discuss the relevance of such definitions. I am quite certain that the Commission has adopted rules defining only the terms "proven" and "probable" as applied to ore. I was one of the engineers who assisted in the design of Form A-O-1, the form in which those definitions appear, and I think it may be of value to describe the reasoning which led to the adoption of the terms, which are defined on page 2 of the Instruction Book for form A-O-1 as follows:

Proven Ore—The term "proven ore" means a block of ore so extensively surrounded by sampled faces that the risk of failure in continuity is reduced to a minimum.

Probable Ore—The term "probable ore" means ore as to which the risk of failure in continuity is greater than for proven ore, but as to which there is sufficient warrant for assuming continuity of the ore.

In its function of supervising the registration of new securities to be issued, the SEC attempts to ascertain that a full and fair disclosure of all the material facts in regard to the issues is made to potential purchasers. In the case of a new mining venture with no long established record of production, the condition of the ore reserves and the geological possibilities of the property are without doubt material facts to investors. Without a reasonably clear statement of the facts in respect of these essential assets, no investor can judge the merits of a mine.

In the process of development of such statements it is one of the prime essentials that quantitative expressions be so modified by descriptive terms that it will be indicated to the reader the degree of accuracy to which the facts described are known, and when quantities involving diminishing certainties of their definitive data are to be described, categories to indicate that diminution of certainty must be established.

The problem is, I think, well illustrated by the example commonly quoted in studies of significant figures of the experienced apple-grower who is set down in the midst of an apple orchard and asked to make a statement, which will not mislead a person of average understanding, of the number and quality of the apples which he believes to be in the area within his vision. He looks directly over his head and can see within a distance sufficiently short to observe detail four apples of excellent quality and one with a slight defect. He notes that the trees in his immediate vicinity could reasonably be expected to bear 150 apples each. He turns and looks as far as he can in each direction and is able to count 400 trees before his visual perception is obscured by the blending of individual trees in the distance. He looks up at an angle and notes that some three miles away are high mountains on all sides. What can he say?

He can say definitely, "There are four apples of excellent quality and one of second grade."

He can say with some lessening of certainty, "In addition there are 400 trees plus probably 200 around them, say 600 in all, each of which has about 150 apples, say 90,000 in all, of which it is probable that 4/5 are of excellent quality and 1/5 second grade."

He can say with much less certainty, "I know that these trees will not grow on the mountains enclosing this valley. Since it seems to be a good valley for growing apples it is probable that beyond my vision there are other trees, but without knowledge of the gaps in the orchard land beyond, I cannot state in numbers which would be significant how many apples there are beyond the probabilities I have outlined."

The major point illustrated by the example is that somewhere the classification of groups of diminishing certainty must reach a point where numbers are no longer significant and beyond which point the use of numbers will be misleading in that they will imply a certainty which does not, in fact, exist.

The apple-grower may have desired to subdivide his statement into four groups, for instance; the five apples nearby, those he could count on 10 trees within a few feet, those he could estimate on 400 trees nearby plus 200 he could reasonably assume to exist, and the unknown space beyond limited by mountains. He may have wished to add another classification separating the 400 nearby and the 200 assumed trees beyond them, but finally he must come to the point where quantitative data could not be significant and must give way to a general discussion of the limits and possibilities under which apples might exist in the valley.

Similarly with ore reserves, the amounts and grades of which must, in the nature of the concept, be increasingly uncertain as calculations are projected farther and farther from sampled exposures. The question of the number of categories necessary is, of course, an open one, but in discussions at the SEC we concluded that two numerical categories would be sufficient to cover most cases and that further classification would only result in needless intricacy of detail and in confusion to the lay leader.

In order to make the group names intelligible to the layman, we chose the simplest terms available in customary mining parlance, that is "proven ore" and "probable ore." In the matter of definition of proven and probable ore, we, I believe, allowed ample latitude for the wide variety both as to form and homogeniety of individual ore deposits and for the judgment of the reporting engineer in his estimation of their quantities and values. The definitions are couched in the broadest terms and only serve to emphasize the usual meanings, in any usage, of the terms "proven" and "probable." As an administrative procedure, of course, it is the duty of the engineering staff of the Commission to attempt to satisfy itself by analysis of the data filed with the registration statement that such quantities and values are actually proven and probable in each case.

Assuming, as we did, that two classifications are enough to describe adequately all ore reserves to which numbers can be attached significantly, it was, we felt, unnecessary to name any further classes of reserves, since they might much more appropriately be described in terms of the geological limits and possibilities of their occurrences than by a defined name such as "possible," "tentative," and so forth.

JESSE L. MAURY.

—■—

The annual banquet of the Kanawha Valley Mining Institute was held Saturday, May 13, at Montgomery High School in Montgomery, W. Va. D. W. Martin is president of the Institute.

Meeting of Zinc Institute

The 21st annual meeting of the American Zinc Institute was held at the Hotel Statler, St. Louis, Mo., April 17 and 18. A meeting of the Galvanizers Committee, also sponsored by the Institute, was held at the same time, and several of its sessions were conducted jointly with the Institute.

A report of Secretary Ernest V. Gent, together with an account of the promotion work of the Institute, was featured on Monday morning, with past accomplishments and future plans thoroughly discussed. On Monday afternoon, Julian D. Conover, secretary of the American Mining Congress, reviewed the Washington legislative picture, and European and world zinc developments were reviewed by such well qualified men as George C. Heikes, G. H. Cunningham and O. W. Roskill—both production and market aspects being thoroughly covered.

On Tuesday, the morning and afternoon sessions were held jointly with the Galvanizers Committee, during which C. S. J. Trench, president of the C. S. Trench and Co., discussed "Zinc in the Domestic Market," and successful application of modern methods in developing farm and industrial markets were demonstrated by I. Don Ross, Ray Crow and M. A. Watkins. Technical papers featured the afternoon session, including discussion of "Lead Linings" by Ernest Mantius; "Tank Tests" by G. C. Bartells, and "Tank Analyses" by W. M. Pierce. The meeting was closed by a showing of the U. S. Steel Corporation's outstanding technicolor movie entitled "Steel—Man's Servant."

New Officers elected at the meeting are as follows: Howard I. Young, president; C. Merrill Chapin, Jr., J. O. Elton, and J. A. Robinson, vice presidents; John L. Good, treasurer; and E. V. Gent, secretary.

Members of the newly elected board of directors are: S. A. Easton, J. O. Elton, C. A. Geatty, Clarence Glass, M. L. Havey, J. E. Hayes, J. W. Hegeler, H. W. Lohman, G. W. Potter, A. L. Queneau, J. G. Starr, and H. I. Young.

A luncheon meeting of this group was held on Tuesday.

Special entertainment features included the annual dinner and smoker on Monday night, and the informal buffet supper and smoker on Tuesday.

An additional feature was a special exhibit of galvanized products which were displayed in the meeting room.

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Operation Retort Furnaces Discontinued Indefinitely

The American Zinc, Lead & Smelting Company has notified the employes of its slab zinc division at East St. Louis, Ill., of its intention to discontinue all operation of retort furnaces at that plant for an indefinite period. This will necessitate the laying off of approximately 325 men, most of whom have been in the employ

of the company for many years. It will be the first time this division has been entirely closed since it was built and put into production in 1914.

In making this announcement it was explained that greatly increased operating costs brought about in the last three years through increased cost of labor, fuel, supplies, and taxes make it absolutely impossible to compete with the low price of metal coming into this country, under our new tariff rates, from Belgium and Mexico. The new duty, which became effective January 1, 1939, reduces the protection for domestic producers of slab zinc by $7 per ton. In addition to the reduction in duty, the ocean freight rate on metal has been reduced more than $3, making the total decrease in protection to the domestic producers of slab zinc above $10 per ton.

The labor rates now being paid became effective when zinc was selling above 7c per pound. Present rates represent an increase in common labor rates of 71 percent and skilled rates of 38 percent, or a plant average of approximately 44 percent above the 1929 levels. In 1929 the average price of slab zinc was $130 per ton, which compares with the present price of $90 per ton, and there is little prospect in sight for a substantial increase in the world price of this metal.

—BOOK REVIEWS—

Mine Examination and Valuation. *By Charles H. Baxter and Roland D. Parks. Appendix by Franklin G. Pardee. Second Edition,* 1939. *Michigan College of Mining and Technology, Houghton, Mich. Pp.* 331 *& XIV. Price* $3.50.

Early exhaustion due to widespread demand for the first edition of this work which appeared in 1933 attests the popularity and value of this very thorough treatise on Mine Examination and Valuation. Incorporated in the new edition are many changes suggested by the six-year period of teaching from the text by the authors, as well as suggestions received from engineers in the field.

Treated comprehensively and in understandable manner clarified by pertinent examples are all important phases of mine examination, including sampling, ore estimation, economic considerations, and estimating future costs and profits. Mathematical calculations to determine the value of a property in dollars and cents are treated with equal thoroughness, with emphasis on the Hoskold formulæ, specific examples again being cited effectively. Finally, valuation tables are presented for use in calculating compound interest improvements and discounts, and for computing present values of various types of annuities. A brief summary by F. G. Pardee of the history, functions and operation of the system used by Michigan for appraising mines for taxation purposes, comprises an appropriate appendix.

A very complete bibliography of selective readings on related subjects concludes the book.

Changes in Technology and Labor Requirements in the Crushed-Stone Industry. *By Harry S. Kantos and Geoffrey A. Saeger. Works Progress Administration, National Research Project, in cooperation with Department of the Interior, Bureau of Mines, Report No. E-8. Pp.* 169.

This report is a part of "Mineral Technology and Output Per Man Studies" being carried on by the National Research Project in cooperation with the Federal Bureau of Mines. It deals comprehensively with past productivity, technological changes, operating conditions affecting output per man, and employment prospects in the crushed-stone industry—described as ranking consistently above the iron ore, copper, lead and zinc mining industries in number of men employed.

PUBLICATIONS of INTEREST

U. S. BUREAU OF MINES

Coal Mining in Europe. A study of practices in different coal formations and under various economic and regulatory conditions compared with those in the United States, by George S. Rice and Irving Hartmann. 369 pp. Bulletin 414.

I. C. 7049. Gypsum and Anhydrite, by Forrest T. Moyer. Describes the different methods of producing gypsum and anhydrite and processing them into their various products, as well as giving a general picture of the gypsum industry. 45 pp. 4 tables. 3 figs.

I. C. 7051. First-Aid Training and Results in Logan and Mingo Counties, W. Va., by H. J. Van Der Veer and Ray Ellis. 9 pp. 6 tables.

I. C. 7052. Annual Report of Research and Technologic Work on Coal Fiscal Year 1938, by A. C. Fieldner. 44 pp. 23 figs.

I. C. 7053. Heat Liberated in the Low-Temperature Oxidation of Anthracite, by G. S. Scott. 10 pp. 3 figs. 3 tables.

I. C. 7054. Lithium, by Frank L. Hess. 14 pp. 4 figs.

I. C. 7055. Annual Report of the Mining Division, Fiscal Year 1938, by Chas. F. Jackson. 23 pp. 2 figs.

I. C. 7056. Reducing "Nipping" Hazards When Tramming Coal-Mining Machinery, by E. J. Gleim. 3 pp.

I. C. 7057. State Regulations Pertaining to Hoisting of Men, *by* L. C. Ilsley and E. J. Gleim. 13 pp.

I. C. 7058. Mining and Milling Methods and Costs at the Alice Unit of the American Smelting & Refining Co., Alice, Colo., by Jos. R. Guiteras. 15 pp. 4 figs.

I. C. 7060. Some Phases of Haulage Accident Prevention in Anthracite Mines, by R. D. Currie. 13 pp. 2 figs. 2 tables.

I. C. 7061. Accident Prevention at a Copper Smelter, by E. A. Anundsen. 26 pp.

R. I. 3428. Carbonizing Properties of a Subbituminous Coal from Puritan Mine, Dacono, Weld County, Colo., by J. D. Davis and V. F. Parry. 32 pp. 9 figs. 18 tables.

R. I. 3437. Progress Reports—Metallurgical Division. 31. Ore-Dressing Studies. Flotation of Southern Illinois Lead-Zinc-Fluorspar Ores, by J. B. Clemmer, W. E. Duncan, F. D. DeCaney, and M. Guggenheim. 31 pp. 4 figs. 21 tables.

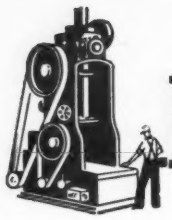
R. I. 3438. Progress Reports—Metallurgical Division. 29. Silver-Recovery Studies, Some Factors Affecting the Flotation of Silver Minerals, by E. S. Leaver and J. A. Woolf. 25 pp. 10 tables.

Progress Reports—Metallurgical Division. 30. Electrometallurgical Investigations Recovery of Potassium Sulphate and Alumina from Alunite, by Fusion with Boric Acid, by J. Koster, R. G. Knickerbocker, A. L. Fox, and P. R. Perry. 15 pp. 3 figs. 15 tables.

R. I. 3439. Mount Weather Testing Adit Progress Report 1, by McHenry Mosier and Wing G. Agnew. 12 pp. 2 tables.

R. I. 3440. Reclamation of Stripped Coal Land, by Albert L. Toenges. 11 pp. 26 figs.

Review of the International Situation During 1938 with Special Reference to Mineral Production and Trade of Central Europe. Foreign Minerals Quarterly, Vol. 2, No. 2.

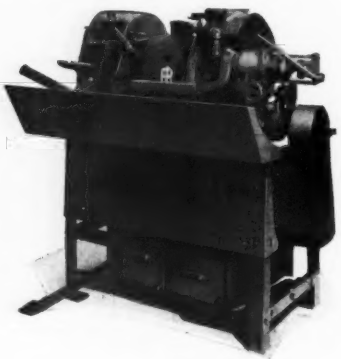


MANUFACTURERS' Forum

Semi-Automatic Jackbit Grinder

A new semi-automatic high-production Jackbit grinder has just been announced by Ingersoll-Rand.

Known as the size J-5, this one-man machine is capable of increasing production to 60 average hard bits or 100 average annealed bits per hour. Gauging is done automatically while the operator is forming the face of the bit.



This new machine is adaptable for use with all types of standard detachable rock-drill bits and is particularly suitable for use by mines, quarries and contractors.

Detailed information is contained in an eight-page bulletin, form 2534, copies of which are available from the Ingersoll-Rand Company, 11 Broadway, New York City, or any of their branch offices.

Hercules to Construct Synthetic Ammonia Unit

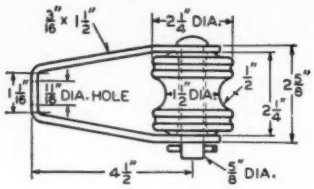
Plans have been completed by Hercules Powder Company, Wilmington, Dela., for the erection of a synthetic ammonia unit at its industrial explosives plant at Hercules, Calif.

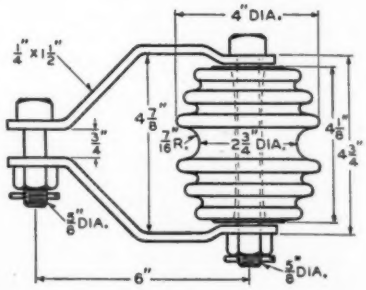
This operation will take care of the plant's requirements of ammonia, the raw material used in the production of nitric acid and ammonium nitrate for the manufacture of dynamite.

Expected to be in service by January 1, 1940, the new plant will provide employment for 32 men.

Insulated Clevis Assemblies

Three types of insulated clevis assemblies, designed for various applications on distribution and rural lines, have been brought out by the Ohio Brass Company, Mansfield, Ohio. One type, having a 2¼-inch spool insulator held by a 4½-inch long clevis, is for dead-ending and corner construction on secondary circuits. The other two types have a larger spool insulator, 4⅛ inches long, and are suitable for primary circuit dead-ends and corner





construction, series street lighting circuits and other applications. One of the larger-spool assemblies has a closed clevis (illustrated) for through or cross-arm bolt mounting. The other (also illustrated) has a split clevis with attachment bolt which permits it to be fastened with an eye bolt, hook or cable, or to be bolted directly to the supporting piece. The split clevis is particularly adapted to corner construction because it is easy to attach and has the necessary flexibility to equalize strains.

Both spools are made of wet process porcelain, the same as used for high-voltage insulators, and have high electrical and mechanical values. They have a tapered hole which distributes

American Chain & Cable Co. at New York World's Fair

The American Chain & Cable Company, Inc., exhibit at the New York World's Fair is located in the Metals Building just across from the familiar Trylon and Perisphere. The primary theme is expressed in a series of three large murals spread across the top of the exhibit. These murals indicate how the ACCO Industries are helping to build the "World of Tomorow" by serving industry, agriculture and transportation.

A replica of preformed wire rope in heroic size, slowly rotating, with special lighting effects, occupies a commanding position. Around this is a slowly rotating unit on which are shown, by isographic drawings, the various steps in the manufacture of wire rope, from the iron ore to the finished product.

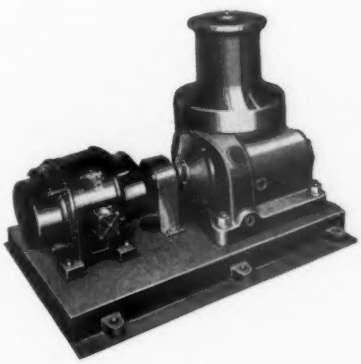
On the backgrounds and pylons is a series of graphic representations of the principal products of the several Divisions of American Chain & Cable Company, Inc., and a large globe, with special designations to indicate the world-wide markets and activities of the ACCO organization, slowly revolves in a special niche.

loads more evenly and minimizes the possibility of spool breakage should the bolt be deflected under heavy mechanical load. The clevises are made of steel, hot-dip galvanized. On the two larger assemblies the clevis is offset near the spool, increasing the flashover value of the units.

Car Spotters

For economically, quickly spotting railroad cars for loading or unloading, Link-Belt Company announces that it has developed a line of two new vertical-capstan electric car spotters, designated as No. 5-A and No. 10-A, respectively capable of 5,000 lbs. rope pull or moving one to three cars, and 10,000 lbs. rope pull or capacity to move three to six cars, depending upon track conditions, whether level, on grade, straight, or curved.

The new machines employ a high torque electric motor of user's choice,



connected to spotter drive mechanism by an encased flexible roller chain coupling, and mounted with the spotter, on a welded steel base plate.

The vertical capstan, made of semi-steel or cast steel, is machine-finished to prolong the life of the haulage cable. A sturdy housing completely encloses and protects the gearing.

Both styles are illustrated, tabulated and described in a new six-page Folder No. 1592. A copy may be obtained by addressing Link-Belt Company, 2410 West 18th Street, Chicago, or other office of the company.

White Print Machine

The Ozalid Corporation announces the new Model E white print machine as an outstanding development in the equipment for making technical white prints—one that combines an entirely new Ozalid printer with an advance type of developer in a single, compact, lightweight unit.

The new machine constitutes a complete reproduction department in itself, with no washing trays, no potash baths, no driers or other equipment necessary. The machine handles all Ozalid sensitized materials up to and including 42 inches in width at speeds up to 30 lineal inches per minute, yet is only 56 inches wide, 18¼ inches deep and 18 inches high.

High printing efficiency is maintained without constant cylinder cleaning by an effective air filter, and an automatic electrically-controlled drip feed is used for development medium.

Complete details will be furnished by writing this magazine.

Rubber Ball Solves Screening Problem

Of interest to every ore, crushed stone, and coal operator is a new development which reduces "blinding" in the screening, announced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., builders of crushing, cement and mining equipment.

This new product known as the Sta-Kleen Screen, represents a distinct improvement over the company's vibrating screens, commonly used in the mining industry. It is intended for use in screening moist material, fine crushed stone, ore, and coal, which usually causes blinding of the screen. In the new Sta-Kleen Screen this blinding is reduced to a minimum.

Several inches below the screen is built a secondary deck. This lower deck is made of metal, perforated with comparatively large holes. The space between the screen and the secondary deck is divided into square or rectangular compartments and each contains a special rubber ball. When put into operation the motion of the screen causes the balls to bounce rapidly between the screen and the deck. The rapid impact of the rubber balls against the screen sets up a secondary vibration that dislodges the moist materials from the mesh of the screen.

Priming Pellet Powder

A new method of priming pellet powder with an electric squib, which is much safer and more dependable than the method in general use, has been devised by E. I. du Pont de Nemours & Company, Wilmington, Del.

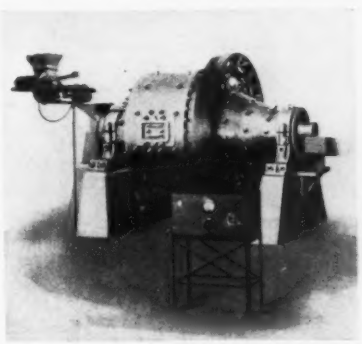
The method suggested is to draw the squib and wire all the way through the cartridge and for about 10 inches beyond. The squib is then brought around the outside, separating the wires one on each side of the cartridge, and reinserted in the front end. The wires are then pulled taut. Separating the wires helps prevent short circuits.

The method now commonly used in coal mines is to insert the squib in the end of the cartridge and make a half hitch with the wires around the cartridge. The new method anchors the wires more securely and the squib is much less likely to be dislodged from the explosive.

"Electric Ear"

Hardinge Company, Inc., York, Pa., announces the "Electric Ear," a device that seems destined to revolutionize methods of operating grinding mills. This equipment was first displayed to the mining industry at the Metal Mining Convention of the American Mining Congress at Salt Lake City in September, 1937.

The equipment consists of a cabinet and microphone, which is placed near the mill, and which listens to the sound. This noise produced by the mill is instantly transmitted to the cabinet which controls the feeder of the mill. Experience shows that no matter how uniform the feed to the mill may be, that there is always irregularity due to size variation and other factors that are directly related



to the noise produced by the mill. Therefore, the ideal operating condition of the mill cannot be steadily maintained by the operator's own hearing. Sound is an important factor in mill operation and the "Electric Ear" listening to the noise of the mill, whether it is quiet, normal or "dead," automatically and positively reports the sound to the cabinet, which immediately regulates the feed to the mill to produce the most efficient operating condition.

Use of Centrifugal Driers

A new folder describing the use of Carpenter Centrifugal Driers in all industries where there are granular materials to be dried, has just been issued by Koppers-Rheolaveur Company, Pittsburgh.

The company also has issued a leaflet concerning Koppers wedge-wire screens for the removal of free moisture from fine material.

Features claimed for the Carpenter driers include: Maximum moisture removal; large capacity, continuous feed, which reduces power costs; low maintenance cost through simplicity and quality of construction.

INDEX TO ADVERTISERS

LAY-SET *Preformed* -THE WIRE ROPE ENGINEERS LOOK UP TO . . .

There are several good reasons why engineers and operators recognize the superiority of LAY-SET Preformed Rope for the majority of applications. In the first place, LAY-SET is preformed and so is free of the locked-up internal stresses which cause kinking, whipping, bad spooling on the drums, or rotating in sheave grooves. LAY-SET resists all these destructive tendencies. Being carefully preformed, LAY-SET is much easier, faster and safer to handle. It requires no seizing when cut; splices or sockets readily and with greater certainty. You gain *all* these advantages when you specify LAY-SET Preformed—any one of which might easily result in greater dollar value for you. All Hazard Wire Ropes Made of Improved Plow Steel are Identified by the Green Strand.

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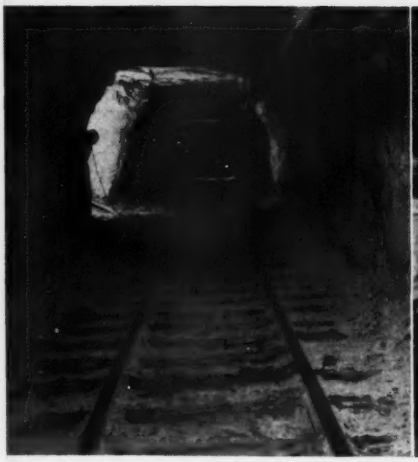
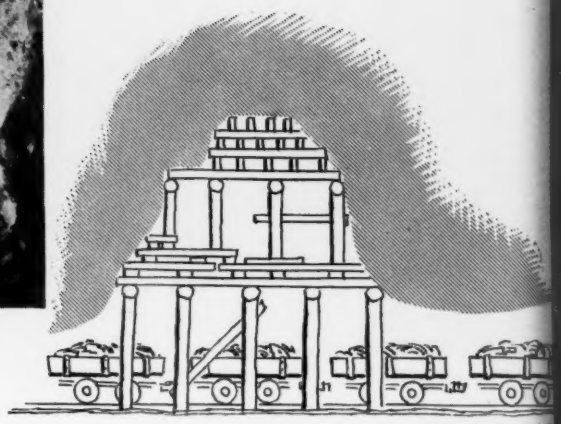
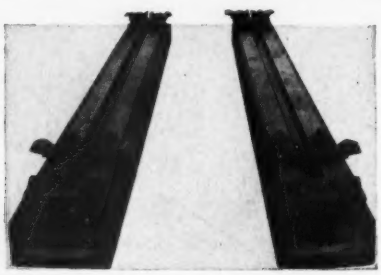
PRESSURE-TREATED TIMBER *Pays for itself*



Pressure-creosoted oak mine ties in an Illinois mine in excellent condition after 12 years.

Pressure-treated timber sets and stringers in the main heading of a Pennsylvania coal mine.





THE AR-MOORED TIE, used in the working sections of modernized mines, provides a high capacity track in temporary locations that stays firmly in place until it has to be taken up and moved. It pays for itself in labor costs over wood ties and pays for itself over plain steel ties in the stability it gives the track and the consequent prevention of derailments and tie-up of expensive equipment.

A MINING COMPANY was operating in a coal seam which lay in a rolling formation. The main haulageway had to be on grade and, to level it, it was necessary to take out parts of both top and bottom. The roof began to air-slack until it was over 35 feet high in places. Untreated timbering used to hold it up decayed in two years and permitted more roof falls. The Wood Preserving Corporation supplied pressure-creosoted timbers which have held the roof for 10 years already and show no deterioration.

OTHER USES FOR PRESSURE-TREATED TIMBER: Tipples . . . Piling . . . Guard Rails . . . Fences . . . Poles . . . Buildings, Bins, Sheds . . . Piers . . . Docks, Wharves . . . Platforms . . . Flooring . . . Tanks, Sumps, Vats . . . Crossing Plank . . . Barge Sides and Bottoms . . . Cable Ways . . . Conduit . . . Culverts . . . Flumes . . . Trench Lining and Covers . . . Conveyor Decking and Supports.

OTHER KOPPERS PRODUCTS FOR THE MINING FIELD: Koppers Rheolaveur Process . . . Menzie's Automatic Cone Separators . . . Koppers-Llewellyn Automatic Washers . . . K-R-M Dry-Cleaning Separators . . . Coal Tipples . . . Koppers-Birtley Dedusters . . . Carpenter Centrifugal Driers . . . Boiler and Power Plants . . . Mine Shops . . . Fast's Couplings . . . American Hammered Piston Rings . . . Cylinder Packing . . . Bronze and Iron Castings . . . Flotation Oils . . . Bituminous-base Paints . . . Coal Tar Roofing . . . Waterproofing . . . Tarmac for paving.

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